School Shop

vol. XVIII no. 4
DECEMBER 1958

Industrial-Arts Education in Senior-High Schools
by Robert L. Woodward

Mathematics and Ben Catlin
by F. L. Curran

Automobile Wiring Mock-Up System
by Dewey Fontenot

Homework for—Ahem!—Drafting Students
by Bob Reeves

Cover Story: The distaff side is always welcome and here is an example of a young lady taking photography in an industrial-arts program in a California senior-high school. For direction in planning a senior-high industrial-arts program, turn to page 7.

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CONTENTS

Industrial-Arts Education in Senior-High Schools.....Robert L. Woodward 7
Four factors to consider when planning a program for senior high are discussed here.

Mathematics and Ben Catlin.....F. L. Curran 9
This lad correlated math, tool design, drafting, and bench metal work to make his project, proving there's more to industrial-arts than meets the hand.

Automobile Wiring Mock-Up System.....Dewey Fontenot 10
The bane of many mechanics' lives—and teachers'—is eliminated by this ingenious device. It removes the mystery of auto wiring systems.

Homework for—Ahem!—Drafting Students.....Bob Reeves 12
Have you ever thought about it? You have? Have you ever assigned any?

Novelty Cribbage Board.....E. A. Rerucha 14
It will look pretty under the Christmas tree.

Concho Belt and Buckle.....Everett V. Traylor 15
A spiffy leather-craft project for your eighth-graders.

Drag Plates.....John Kluz 16
The "hot rod" set will surely go for this one. It's a "natural."

A Visit to Mr. Brown's Industrial-Arts Class.....Andrew K. Ault 17
Perhaps here is a hint towards a solution to the problem of getting your industrial-arts classes going.

"Paying Off".....Earl E. Tatro 18
Here is an eye-protection plan that is "paying off" in grand style. The author relates in detail how you can make an eye-protection program in your shop a success.

Silk Screening a Printed Circuit..William Bowers and Rex Miller 22
Two phases of your shop program get in on this one: electricity and graphic arts.

REGULAR FEATURES

School Shop Talk..... 2
Are You Missing a Bet?

In the Morning Mail..... 3
Comment from readers.

Here Is a Way..... 16
How to publicize your industrial-education program.

Strictly Personal..... 20
About your fellow teachers.

School Shop Kinks..... 24
Short cuts for doing shop work.

Diamond Dust....Thomas Diamond 26
Bawbees Are Not All.

News..... 28
Happenings in industrial education.

Instructional Resources..... 30
The latest in books, pamphlets, and audio-visuals.

News from Industry..... 34
New products and teaching aids. Send in a card today.

Project Design....Robert A. Tinkham 40
What the industrial designers are doing.

From Washington....Michael Paca 44
News from the Nation's Capital.

Index to Advertisers..... 44
Send in a card today.

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

Are You Missing a Bet?

Student interest and enthusiasm for shopwork often lead youngsters to come in after school, evenings, and Saturdays to work in the school shop if it is open. The stimulation of achievement in making something that has value and that is the result of the youngster's own efforts gives him a sense of satisfaction that is seldom matched in other areas of the school program.

This interest, plus the natural inclination of boys to want to "belong" and to "do something" worthwhile, makes the industrial-arts club idea a natural. In the November, 1957, issue of SCHOOL SHOP, we carried an article by Rex Miller on the club he had developed in a small high school in Iowa. Today there are 52 schools and at least one college group using the emblem developed for the Ankeny, Iowa, school group and a similar number are using the constitution that was drawn up by the group. These represent 27 of the 49 states. Mr. Miller, who is now at the College for Teachers at Buffalo, N. Y., is still receiving requests for copies of the constitution.

A nation-wide organization, under proper sponsorship, could develop such a program into a vital, lively, and worthwhile national organization. There is precedent for such a program in the Future Farmers of America, the Future Teachers of America, and similar groups that have proved their worth through the years.

Industrial arts could well stand a similar type of national organization that would serve to interest high-school boys and girls in our modern industrial technology and give them an outlet for service to the school and the community. Moreover, club activity serves a useful purpose in developing good citizenship and for learning how to work together.

Under proper sponsorship, such as the American Industrial Arts Association, the American Vocational Association, or a college or university, a national program could be developed that would serve a useful and wholesome social purpose. Funds could probably be secured from industrial or foundation sources to get it under way.

In the meantime, you could put your school on the map and offer students a worthwhile activity if you started a club in your own school. While numerous schools, such as Crispus Attucks High School in Indianapolis, and some states, such as Texas and Illinois, have active organizations, there are many schools without them. Don't miss such a bet for harnessing student interest and enthusiasm. Let's have more news in the papers of student achievement along these lines and less about juvenile deliquency or the shortcomings of modern education.—shortcomings of education.—*L.W.P.*

What about Projects?

Every so often a philosopher in the industrial-arts field will issue a pronouncement about how terrible it is that shop teachers lean so heavily on projects. "Let's teach young people," he cries, "not projects. Knowledge is what counts. More attention needs to be given to related information."

You and I know what would happen if projects were taken out of the industrial-arts course. No longer would it be unique. It would become social studies, mathematics, and science rolled up into a sticky ball with a stultifying covering of drill in hand and machine-tool processes.

Projects make possible the achievement of making something that is the student's own. They give an opportunity for feeling that joy of creation that too often is lacking in educational activities. Moreover, the project method of instruction is flexible so that gifted students can be challenged but the less gifted can still experience the satisfaction of accomplishment and learning.

Projects are a ready-made approach for problem solving and for learning manipulative skills. But if learning does not take place, the project is useless.

Projects have their unique and stimulating values as mentioned above, but these objectives must be taught for and planned for in using projects. Here is where some shop teachers fall down and where shop teaching is vulnerable. Projects are an excellent learning tool but they must be used as learning tools —not as a ready-made crutch for the teacher.—*L.W.P.*

IN THE *Morning Mail* . .

[Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Dear Sir,

In response to the invitation on page 2 of your June issue to describe summer programs, the Berwick Area School District for the past three years has conducted such a program with the undersigned directing it. It lasts six weeks.

Attendance was so overwhelming in the past that a new schedule was adopted this year. Junior-high students use the shop in the morning and elementary students in the afternoon, with the latter being the most enthusiastic about their work and attendance. There is no compulsory attendance or hours—students come and go as their free time permits. While this might seem like a disorganized procedure, the program works very well because of advanced planning of projects, materials, activities, and tool use.

The Berwick Junior-High School industrial-arts shop is used every summer, not only to keep tools and machines from being idle, but to offer to boys and girls varied opportunities for development. . . .

The photograph shows some of the elementary students with plastic, wood, and metal projects.

Donald M. Egner,
Berwick, Pa., Area
Junior High School

Dear Sir,

I read with considerable interest and agreement W9YFZ's article, "Is Ham Radio for You," in the September issue of SCHOOL SHOP. . . . I had played with radio since 1926, but for various reasons (largely the code hurdle) had never been interested in obtaining an amateur license. We had a radio club and coasted along for some years building receivers and odd gadgets.

Then several boys became fired with the "ham" idea, but I found it would be necessary for me to acquire a general class license in order to receive a license for a school station. This was quite a set-back as I visualized the "old dog learning new tricks" at 13 words a minute. I was ready to give up the idea but the novice license was then made available which required but five words a minute. A whole new vista opened up for me. I obtained my call, K2AMP, and one for my school station.

Interest in the club grew and I found a new type of boy entering the club who had serious purpose, thoughtfulness, and enthusiasm. I estimate that nearly 80 percent of the boys in the club have gone on or are preparing to go into some branch of electronics. Not all obtained licenses, but the opportunity to experiment and absorb some knowledge of radio certainly fulfilled the guidance function of industrial arts. . . .

J. W. Millard,
West Islip, N.Y.,
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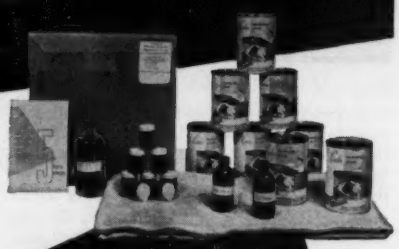

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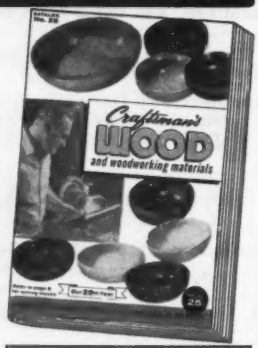

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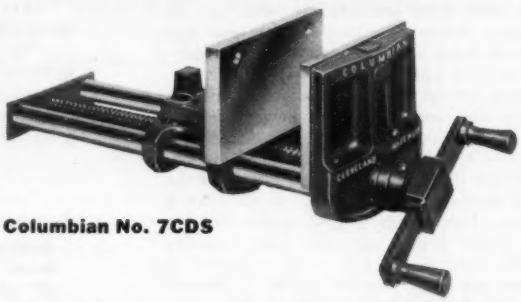

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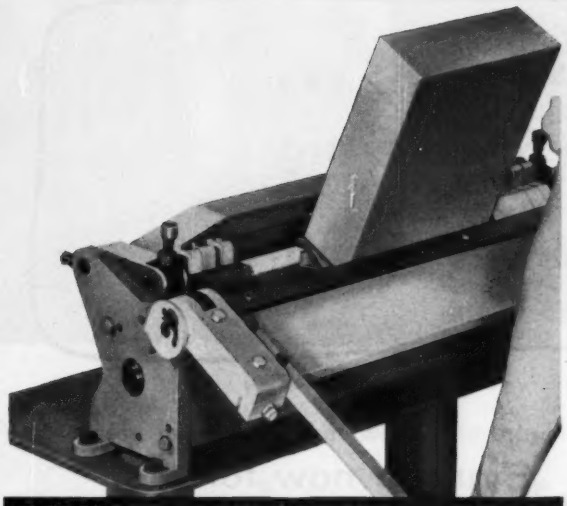

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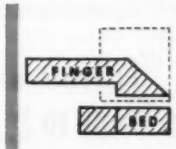

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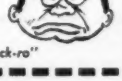

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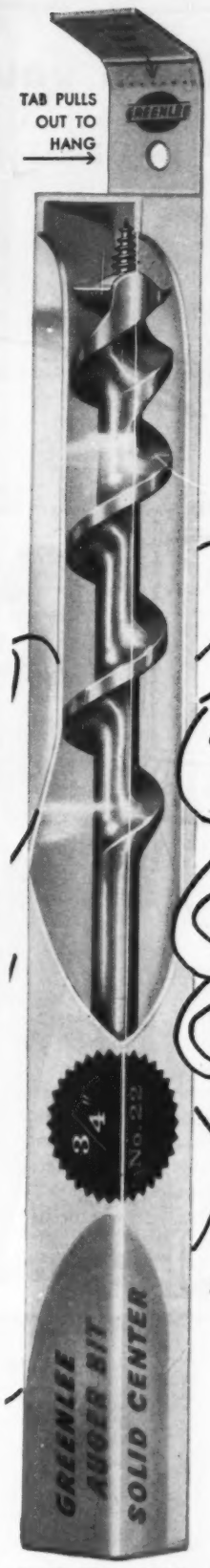

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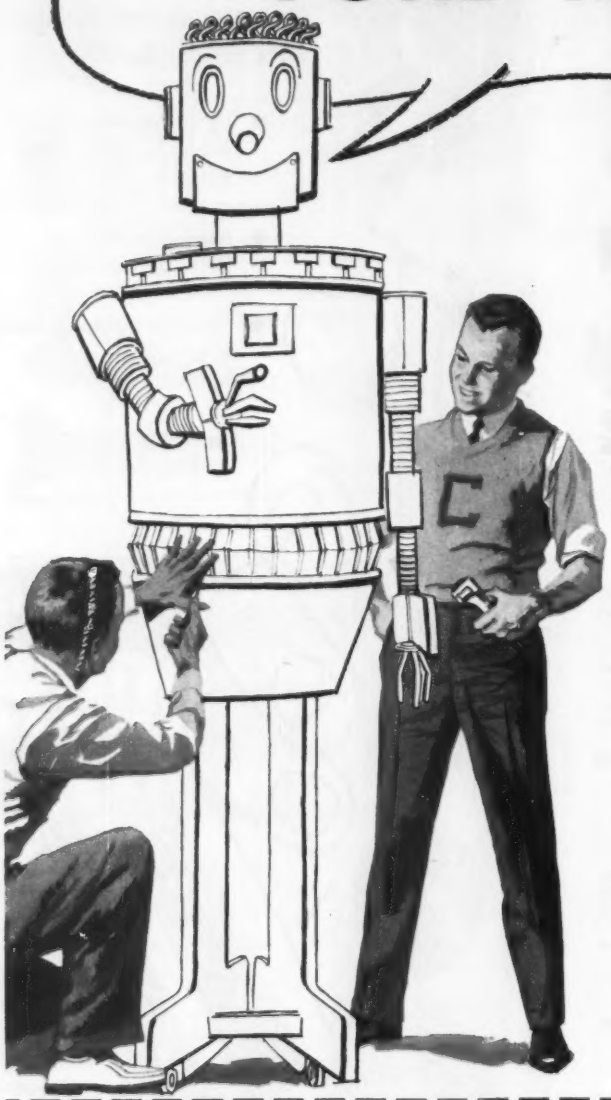

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Extensive graphic-arts work is an important part of the high-school industrial-arts program in California.

Four factors merit attention when planning

Industrial-Arts Education in Senior-High Schools

By Robert L. Woodward

Consultant in Industrial-Arts Education, California State Department of Education, Sacramento

TEACHERS, supervisors, and administrators must take into consideration a variety of factors in designing industrial-arts programs to meet the different interests and aptitudes of students in four-year and senior-high schools.

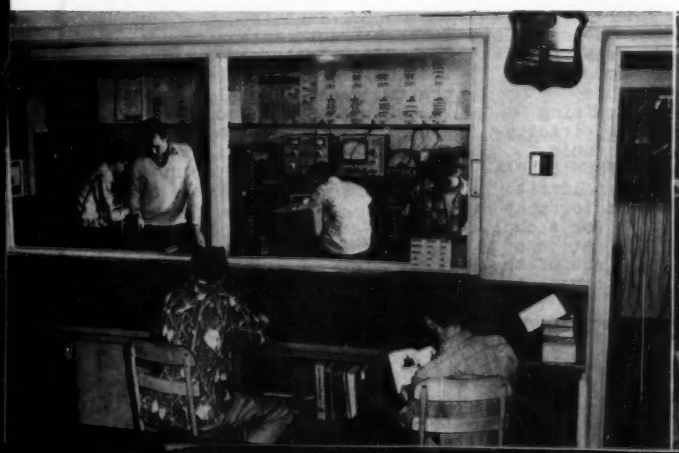
One factor that merits attention is that an increasing number of students entering high school have had introductory industrial-arts experiences in separate shop facilities in either seventh- and eighth-grade programs in elementary schools or seventh-, eighth-, and ninth-grade programs in junior-high schools. In planning high-school industrial-arts programs, teachers, supervisors, and administrators should give consideration to the skills developed and instruction obtained by students in previous industrial-arts courses.

Ways of enriching and extending other subject fields are also factors which should be considered in planning the industrial-arts program. The experiences selected for these purposes should provide students opportunity to (*a*) make practical use of their knowledge of skills relating to tools, materials, and processes in designing objects; (*b*) apply safety practices which have application in school, home, community, and industry; (*c*) develop understanding of oral and written communication as a result of following instructions for shop activities; (*d*) make computations required in planning and completing jobs; (*e*) become familiar with the scientific principles involved in the operation of equipment and in the construction of objects; (*f*) develop effective working relationships and practice democratic procedures through participation in shop management; and (*g*) obtain information concerning requirements of industrial occupations and discover vocational interests.

Planning an Industrial-Arts Program

In planning an industrial-arts program for a particular school, consideration should be given to the potential enrolment of the school. The number and types of shops selected should provide for present needs and future expansion. Attention should be given to the total anticipated enrolment in the shop

Many industrial-arts electronics shops in California high schools include auxiliary rooms for amateur radio and for instrument use and storage.



Experiences in industrial, machine, and architectural drawing are an integral part of the high-school industrial-arts program in California.

program, the enrolment in each phase of the program, and to the needs and abilities of the students who will be enrolled.

Basically, an industrial-arts program should offer students opportunity for experiences in drafting, electricity-radio (electronics), metalworking, and woodworking.

A plan* for the organization of industrial-arts programs according to grade level and school enrolment with recommended number and types of shops and instructional areas is at right.

The enrolment figures used in column one and the number of shops recommended in column two are based on state-wide average enrolments in industrial-arts courses and departments in the public schools of California derived from the reports of secondary-school principals, October, 1953. The types of shops and the instruction that may be provided in these facilities are consistent with the findings of surveys of present practices and with standards appearing in these California State Department of Education publications: *Suggested Courses of Instruction in Industrial-Arts for the Junior-High-School Level, Suggested Courses of Instruction in Industrial-Arts for the Senior-High-School Level,* and *Guide for Planning and Equipping Industrial-Arts Shops in California Schools.*

The number and types of shops listed in column two take into consideration the long-term purpose of each shop and the limitations caused by multiple use of a shop. In the third column, "Areas of Instruction," courses and elements of courses (activities) are presented that may be offered in the facilities proposed in column two.

If the enrolment for a school exceeds the largest total enrolment appearing in column one of the adjoining organizational plan, a duplication of shops could be made according to student demand. Basic and advanced shops could be provided in areas of industrial-arts where the need exists.

Designing an industrial-arts program to meet the different interests and aptitudes of students, giving consideration to previous shop experiences that may have been provided for the students, determining the relationship of industrial-arts courses to the other subject fields, and providing an adequate number of areas of industrial-arts will assist in the development of a program for the high school that is educationally sound. ★

*Developed by the California Industrial-Arts Curriculum Committee and the California State-wide Industrial-Arts Committee for the new *Guide for Industrial-Arts Education in California.* (Publication date: November, 1958.)

Recommended Number and Types of Industrial-Arts Shops and Instruction That May Be Provided for Four-Year and Senior-High Schools According to School Enrolment

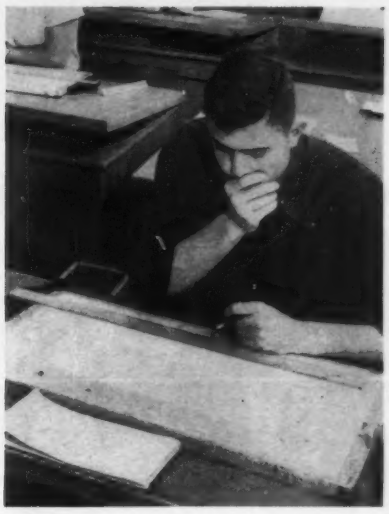
Total School Enrolment	Number and Types of Shops	Areas of Instruction
To 250	One Shop: 1—Comprehensive General	Activities or courses: Drafting, electricity-radio (electronics), general metal, and general wood.
250-500	Two Shops: 1—Metal 2—Wood	Courses: Drafting, general metal, and general wood. (Note: Drafting courses would be provided in a shop classroom, a multipurpose classroom, or the wood shop. Activities or courses in electricity-radio (electronics) may be provided in the metal shop.)
500-700	Three Shops: 1—Metal 2—Wood 3—Auto	Courses: Auto mechanics, drafting, general metal, and general wood. (Note: Drafting courses would be provided in a shop classroom, a multipurpose classroom, or the wood shop. Activities or courses in electricity-radio (electronics) may be provided in the metal shop.)
750-1000	Four Shops: 1—Metal 2—Wood 3—Auto 4—Drafting	Courses: Auto mechanics, drafting, general metal, and general wood. (Note: Activities or courses in electricity-radio (electronics) may be provided in the metal shop. Activities or courses in graphic arts may be provided in drafting room.)
1000-1250	Five Shops: 1—Metal 2—Wood 3—Auto 4—Drafting 5—Electricity-radio	Courses: Auto mechanics, drafting, electricity-radio (electronics), general metal, and general wood. (Note: Activities or courses in graphic arts may be provided in drafting room.)
1250-1500	Six Shops: 1—Metal 2—Wood 3—Auto 4—Drafting 5—Electricity-radio 6—Graphic Arts	Courses: Auto mechanics, drafting, electricity-radio (electronics), graphic arts, general metal, and general wood. (Note: Activities or courses in photography may be provided in the graphic-arts shop.)
1500-1750	Seven Shops: 1—Metal 2—Wood 3—Auto 4—Drafting 5—Electricity-radio 6—Graphic Arts 7—Handicraft	Courses: Auto mechanics, drafting, electricity-radio (electronics), graphic arts, handicrafts, general metal, and general wood. (Note: Activities or courses in photography may be provided in the graphic-arts shop.)
1750-2000	Eight Shops: 1—Metal 2—Wood 3—Auto 4—Drafting 5—Electricity-radio 6—Graphic Arts 7—Handicraft 8—Photography (or a duplication of one of the other shops)	Courses: Auto mechanics, drafting, electricity-radio (electronics), graphic arts, handicrafts, general metal, photography, and general wood. (Note: If photography is provided for elsewhere in the curriculuum, additional courses may be provided in any of the above areas.)

Correlating math, tool design, drafting, and bench metal Work

Mathematics and Ben Catlin

By F. L. Curran

Mackenzie High School, Detroit, Michigan



Ben Catlin went to the drafting room to think.

ONCE upon a time in March, 1955, a boy named Ben came to his instructor in metal fitting at Mackenzie High School, Detroit, with a question. "I need a wrench of an odd size and I can't buy it. What am I going to do?" The answer was, of course, "Make it!"

This, then, is a story of mathematics, tool design, drafting, bench metal work, and, most of all, Ben Catlin. A story of how necessity begat creative effort and, all unknowing, a great example of correlated information.

When the exact sizes were ascertained, a small sketch was made of the proposed wrench. Ben studied several wrench designs and after several more sketches adjourned to the drafting room. After a couple of days in the drafting room he came back to the metal-fitting shop, selected his material, and started to work.

When nearly finished with the job, several other boys asked about wrench designs. The fact that other boys were interested, and also that he needed two more wrenches, prompted Ben to ask another question. "Why do we have to have individual drawings for every different size wrench we make? Why must each wrench be individually designed? Aren't the basic proportions of a tool the same no matter what the size?"

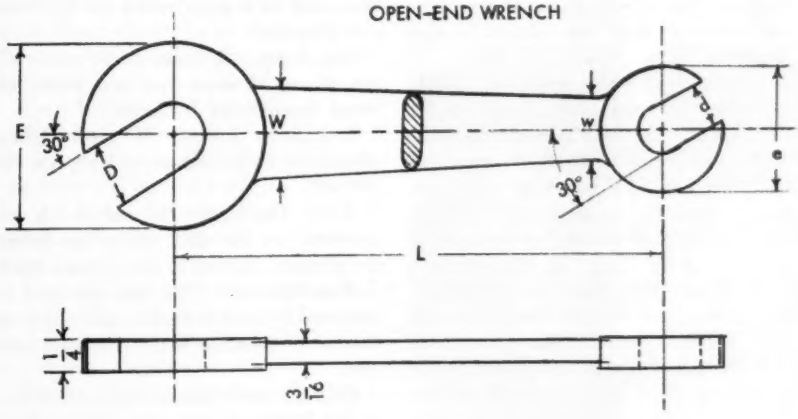
This is an interesting and unusual aspect of our story. After the teacher made the point that all tools must be individually designed, Ben and two other boys got together. The next day the shop teacher was confronted with a sketch which eventually was made into the drawing which accompanies this article.

Arithmetic cannot be taught as related matter. Algebra, geometry, and arithmetic are necessary in the shop in design and layout work. Layout involves some print reading and mathematics. The formulas in the lower right-hand corner of the drawing are necessary for the successful completion of the job. Here is a clear-cut example of correlation of blueprint reading, mathematics, and shop work. Thank you, Ben Catlin.

For your information this is how this blueprint has been used dozens of times since 1955. First a boy decides on a wrench size. With a pencil and paper all of the other dimensions are figured out and a sketch is made. Then the material is selected and the layout made. Several boys have complained that mild steel is not the best. This has led to investigation and study and finally to the conclusion, "No wonder wrenches made in industry are stronger, lighter, and hold up longer."

Since Ben made this drawing, only one part of the design has proven faulty. The hole drilled for the large and small end should be centered 1/8" to 1/4" out from the center line of the wrench. Only that one improvement on the original design has been made in three years. And this speaks well for the design.

Ben Catlin graduated from Mackenzie High School in 1957 and wherever he is he is more than likely still trying to improve something. This attitude of unselfishly trying to constructively improve methods and conditions of work is the ultimate in human endeavor. Without this attitude, progress and happiness would still be mere dreams of philosophers. ★

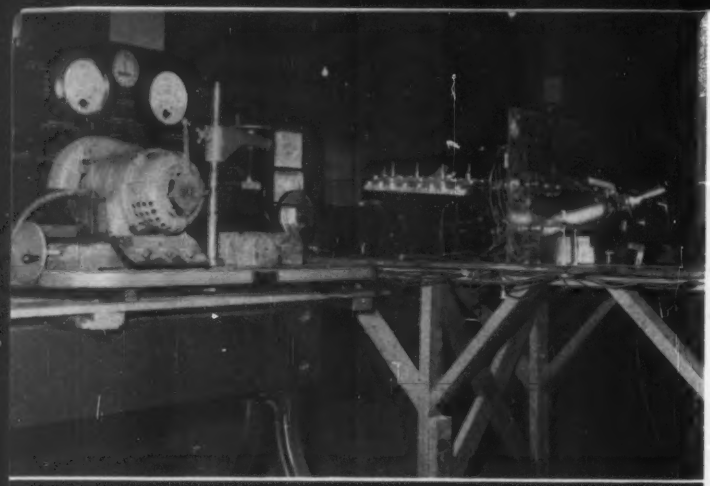


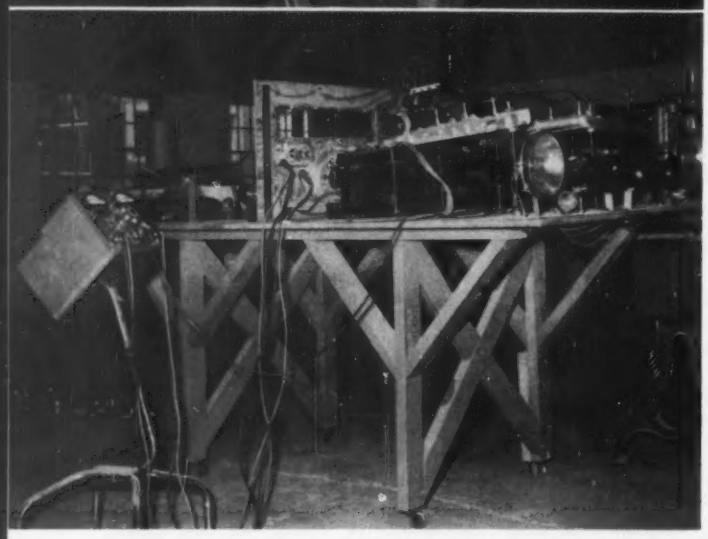
D = LARGE OPENINGS
d = SMALL OPENINGS
E = 3D

MAT: FLAT STOCK

e = 2D
w = D
L = 8D

W = 1 1/2D





Top photo: A left-side view of the simulated auto electrical system. The generator is being driven by an electric motor (left). Bottom photo: A right-side view showing voltage and ampere meter connected for testing.

The mystery vanishes when you teach with this

Automobile Wiring Mock-Up System

By Dewey Fontenot

Prairie View, Texas, A&M College; formerly at Southern University and A & M College, Baton Rouge, Louisiana

MOST automobile mechanics have trouble correcting faulty electrical systems. The reasons for this are several but the most common is that many mechanics do not understand the operating principles of the various circuits. This lack of understanding is compounded by the complexity of the harness and dashboard construction, particularly in late model cars.

Furthermore, if a mechanic is working on a percentage basis, he will be even more reluctant to take on a circuit assignment because of the time it will take, leading to the malpractice of overcharging a customer to compensate for the time taken to do even a small job. (I still remember the disgruntled customer who had to pay for four hours' labor merely to have the turn indicators on his car checked by an "expert" mechanic in a dealer's service department.)

And so, too, it is with students. I found it difficult teaching electrical systems once I left the repair line. The uncanny and ingenious methods used in construction of electrical systems, the meticulous ways the wires are wrapped and neatly tucked in remote places are enough to challenge even treasure seekers, or, in this case, discourage students and even teachers. The accompanying photographs and drawings show my solution to this problem.

I constructed what resembles a table with four legs and used a caster under each leg to make the whole unit portable. Sheetmetal-covered plywood composes the table top. This serves as a ground, too. A smaller piece of plywood and tin serves as the dash board. Two rectangular holes cut in the "dash" are covered with clear plastic. These holes are "windows" the students look through when they hook up switches on the other side of the dash.

Following are the devices that are part of our rig with a brief description of how they are connected and make up this simulated electrical system.

Ignition System: Two cylinder heads with spark plugs were mounted. The distributor is mounted so that it may be turned by hand and the sparks can be seen.

Head, Tail, Parking Lights: Two sealed beams are used but others can be added. Head, tail, and parking lights are controlled by a main switch on the dash and dimmer.

Stop Lights: A brake pedal made of two pieces of wood and two pieces of metal is operated by hand.

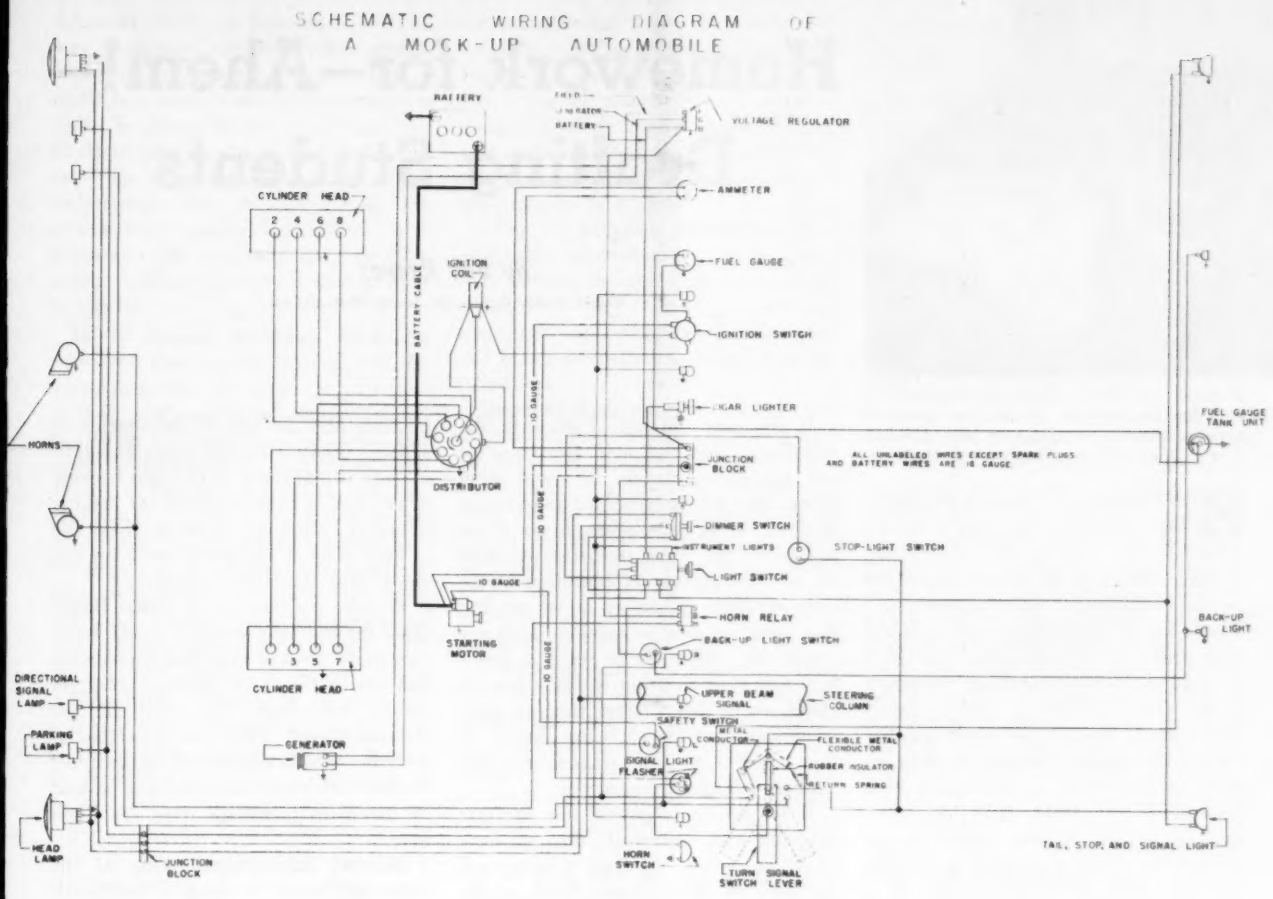
Instrument Lights: All dash lights, which can be turned on and off, are included.

Horn: The horn relay and switch are mounted on the dash while the horns are mounted in front of the cylinder head.

Heat Indicator: The heat indicator is operated by applying a hot soldering iron instead of water as is the case with real cars.

Oil Indicator: The oil indicator is operated by air pressure from the air line.

Fuel Indicator: The dash unit is mounted in a cluster on the dash and the tank unit is mounted on the rear by the tail lights. When the ignition switch is



turned on and the float of the tank unit rises, the indicator on the dash will quickly move to "full" position.

Charging System: The regulator and ammeter are in the cluster on the dash. The generator and battery are mounted on the front end on opposite sides. The generator is driven by an electric motor. A generator tell-tale light can be easily installed.

Turn Indicator: The switch was made with a piece of plywood, seven screws and nuts, and some tin. All of the connections can be seen. The pilot lights are mounted on the dash. The right rear, stop, and signal lights are supplied by the same wire.

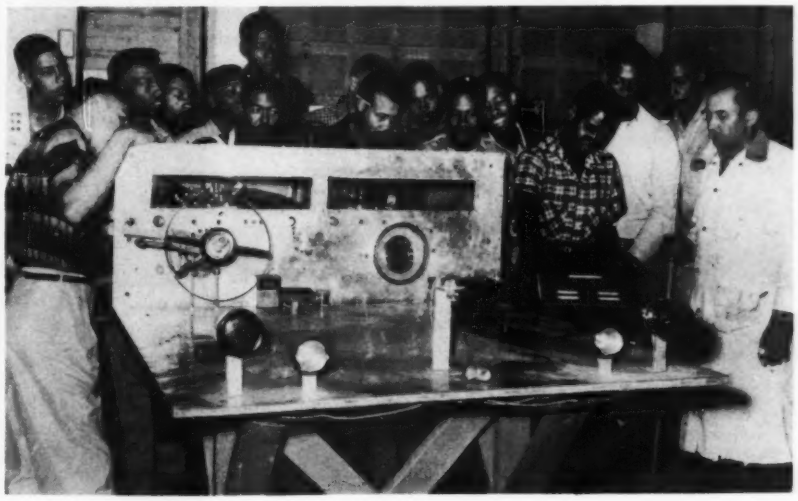
Back-Up Lights: A mast jacket with a shift lever attached to it makes the back-up lights come on when the lever is moved to "reverse."

Starter System: Combination starter and ignition is used. A neutral safety switch was made which is operated by the shift lever. It prevents starting in any "drive" position. A crankshaft and flywheel are mounted in main bearing caps and are operated by the starter motor.

Cigar Lighter: The cigar lighter is mounted on the dash.

A number of tests can be made with this teaching aid, such as all of the charging-system tests, circuit-resistance tests, etc. It has proven invaluable in demonstrating to our students the principles of automotive wiring, one of the more difficult topics in the automotive program. ★

The teacher (right) conducting an auto electrical-system class. Note steering wheel, dash, lights, etc.



A great deal of the preliminary sketching on a design problem can be done at home. It provides practice in sketching and develops greater originality for planning and designing.

A lot can be accomplished when you assign

Homework for—Ahem!—Drafting Students

By Bob Reeves
Chula Vista, California, Junior-High School

HOMEWORK for drafting students? Who ever heard of such a thing? After all, how can anyone be expected to make drawings at home without the proper equipment and supervision? Would my students accept and complete homework even if I did assign it? Can't we take care of our drafting education in the classroom as we always have? These are a few of the questions that come to the minds of most of us when we think of homework in connection with drafting. It is probably true that homework is seldom, if ever, given to our present-day drafting students. Is it really necessary then, or even desirable, as a part of today's drafting curriculum? Let's take a look at the situation.

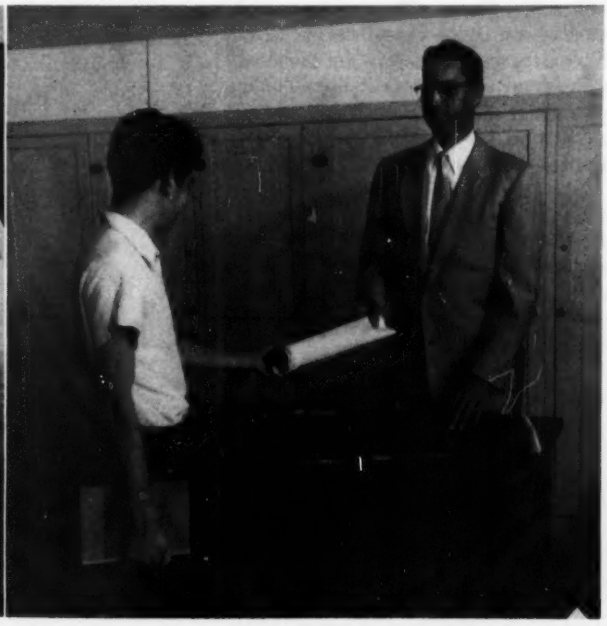
In this day and age of scientific development, and the new awareness of our educational needs, it would seem proper that we examine our program in drafting, as in other areas, to see if we are really providing our students with the greatest amount of education in the time available. When we do so, we find that there are only so many minutes per school day which can be spent in drafting, and most drafting teachers are already using this allotted time to good advantage. Outside or home-time is all that is left then, if we want to give our students additional education.

If we decide to extend our drafting program with homework, then we have to decide next on the type of homework the students should have. Much of the time that a student now spends in the drafting room is used to study drawing methods and the use of instruments in actually constructing drawings. This type of work is difficult to do at home because of the lack of home facilities for making drawings. What sort of work, then, can be done at home which will make our students more competent in drafting?

Perhaps the best way to select homework for drafting students would be to pick those areas of work that supplement and enrich the usual drafting program rather than those that substitute for classroom work. There are a number of activities which might well be included in this enrichment program and several of the more important ones are listed here.

Related Information.—One of the important ways in which a draftsman can become more competent is to acquire a broad background of information in

A drafting scrapbook (left) prepared by each student will be of great help in relating drafting classwork to the drawings and drafting information found in magazines. Many engineers, contractors, and real-estate men can provide occupational information for the student (right) who cares to talk to them about their work. They can also provide an occasional drawing or two for those who trouble themselves to ask.



the area in which he is doing his drafting. This background knowledge is often the chief difference between the beginning draftsman and the really capable one. How, for example, can a draftsman do his best work on an electrical diagram unless he knows a little of the workings of electricity? Or, how can a draftsman draw up the plans for a house if he understands little or nothing of the architectural principles involved? The draftsman who can only trace or copy another's drawing is very limited in what he can do.

If the student draftsman needs his classroom time to develop his drafting techniques, then the assigning of homework to develop a background of related knowledge can well be a necessary and desirable supplement. The student who discovers through his homework the qualities of various kinds of woods can do a better job of making a woodworking drawing. The student who finds out through a special assignment that there are many ways to fasten sheetmetal together will be able to make a sheetmetal drawing with much more understanding.

Sketching.—Practically all of us use a simple sketch at one time or another to aid us in expressing an idea. It may be something scratched on the back of an old envelope to help us prepare for a job around the house. The worker in industry or construction often uses a sketch to convey an idea to someone else. He will probably use a sketch far more than he will ever use instruments in making a drawing. The sketch is a vital means of communication for all of us, and our drafting students can do a lot with sketching as homework.

Preliminary Design.—There is a great need for original design in our drafting education. So much of the work done today in our school drafting rooms is copy work. It is simple for the instructor to assign his students to copy plate X from the book—assuming that in doing so the students will learn all that is needed. This system may have some merit in the development of drafting technique, but it does little in the development of creative thinking and design that most of our students will need in the future. Provide your students, instead, with practical design problems just as soon as they have learned a few of the basic rules for making drawings. You will find that student interest will be much higher, and each student will be able to work more efficiently on his own level of ability. Much of the preliminary design work and gathering of ideas can be done at home, saving valuable school time for final finished work.

Occupational Information. — Many students who are taking drafting are doing so because they feel certain they will have a use for it in their life's work. Many others are taking it because they feel it will be valuable no matter what occupation they finally choose. In any case, a study of various occupations and how they will make use of drafting is important to all students.

After the program content has been established for homework, our next need is to develop definite homework assignments. This can be done in a variety of ways, but some which have been tried and found desirable are included in the following:

Reading Assignments.—If it is possible for students to check out textbooks for home use, assignments can be made from them. A great deal of reference work can be done from assignments in library books, encyclopedias, or even dictionaries. A dictionary is especially useful in looking up definitions for words and terms in such areas as map, architectural, and electrical drafting.

Sketching and Designing. — Most sketching or designing by students at home results in better work if it is based on a definite problem which has been set up by the teacher. If the sketch is for a woodworking project, for example, exact specifications must be given for its use, material it is to be made of, possible methods of construction, and types of finish that might be suitable. A sketch for a house design should be based on the needs of a particular family, and the house should be designed for a certain size and shape of lot, with proper consideration for orientation, climate, etc. Sketching also works well in connection with simple map making. For example, try the beginning student on a sketch of the route he takes to school each day.

General Information. — One of the best ways to maintain student interest in drafting is to give them an opportunity to collect information, such as drawings, clippings from newspapers and magazines, want ads for draftsmen, or other items which relate to drafting. Students can often obtain drawings from contractors, real-estate offices, and business firms which use drafting in one form or another. Perhaps you could even give students special credit whenever they bring in these "extras," or you might have each student prepare a scrapbook to be handed in at a later date.

With all this discussion concerning homework for drafting students, some teachers are sure to wonder how successful it could possibly be in a subject where homework is traditionally almost not to be found. It is true that it may require a little student indoctrination until it becomes a permanent part of your program, but once started most students will accept it and appreciate it for its educational value. Students in most drafting classes represent a fairly typical cross section of students in school. Probably a good many are taking it as a background for engineering and science. There is no good reason why they cannot appreciate the need for homework in your class as well as in the other more traditional subjects.

For an enriched and more interesting program for both you and your students try some homework. You will find it pays in many ways. ★

By Harry L. Hanson

"For example, here's a belt I tooled."

Make one for a Christmas gift

Novelty Cribbage Board

By E. A. Rerucha

Leyden Community High School, Franklin Park, Illinois

THIS is something different and practical in a cribbage board. The author—a cribbage "addict"—had difficulty scoring on the conventional cribbage board. Too frequently it became a question of "coming or going." This led to the design of several unconventional scoring boards, one of which is presented here. Having played over a thousand games on a board somewhat similar, there is no question that a continuous line of pegging holes has an advantage over the arrangement on the conventional type of board.

It is suggested that a piece of maple or birch—⅞" x 7" x 14"—be used for the board so that the lines show up well. Mark off the board into ½" squares and lay out the design very lightly with a soft pencil. Center punch the location of the holes with a sharp punch. Drill ⅛" diameter holes ½" deep. Cut out the shape of the board. Make the peg pocket by drilling two ½" diameter holes, on the edge adjacent, 1¾" deep. Finish with a chisel so that an oblong hole results. Cut the saw kerf for the peg pocket cover with a hack-saw blade. Sand the board smooth on all sides removing all traces of any pencil marks. Slightly round the edges of both the top and bottom surfaces.

Using colored pencils of the kind that will dissolve in water, and choosing two different colors, mark in the lines from hole to hole in groups of five holes, using one color for one line of the word outline and another for the other line of the word outline. Each scorer will choose a color and peg that correspond. It should be noted that, by following the outline of the word "Cribbage," the inside of the *C*, and the *b*'s and *e*; and the top of the *r*, *i*, *a*, and the outside of the *g* are one color. The outside of the *C* and *b*'s and *e* is the other color as well as the bottoms of the *r*, *i*, *a*, and the inside of *g*.

Color the surface between the lines of holes with any light third color. Having completed the coloring of the area between the lines and the lines themselves, which should be about 3/32" wide, place a damp blotter over the colored pencil design. Do not use too much water, just enough to cause the pencil lines to fuse into the wood. Allow to dry and then spray with clear lacquer or carefully brush with clear varnish so as not to disturb the colored lines. Of course, if you desire, enamel or paint may be used, applying it with a small water-color or artist's brush.

Make the peg pocket cover from a piece of #22-gage brass. Smooth all edges with emery cloth and polish. Fasten in position as shown on drawing with a #6 x ½ round-head wood screw. The cover end under the semiround tab fits into the saw kerf. To open, lift up on tab. Adjust the screw so that the cover can be readily lifted but will stay in closed position without opening by itself and allowing the pegs to drop out.

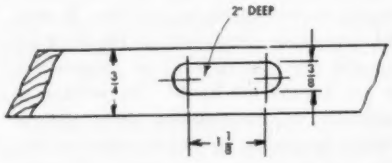
Pegs may be turned from a piece of dowel rod as shown in the drawing, or #8 finishing nails may be cut to 1¼" lengths below the head, and used. File the cut end round and polish smooth with emery cloth. Paint each pair of pegs with corresponding colors used for the lines of the word outline.

When the lacquer, or varnish, is thoroughly dry, the lettering of the numbers may be done. Using a pen and black drawing ink, letter in carefully the numbers between each group of five holes and arrows as shown in the drawing.

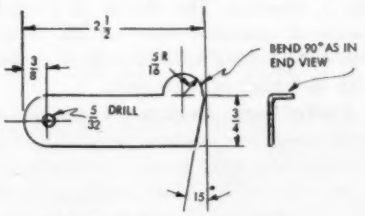
Finally glue a piece of felt to the bottom and trim along the edges.

Bill Of Materials

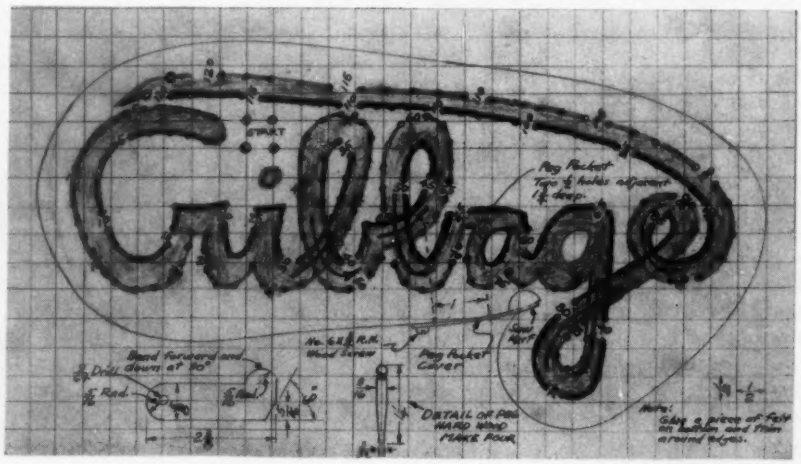
1 piece maple or birch, ⅞" x 7" x 14"
1 piece #22-gage brass, 1" x 2½"
1 #6 x ½ round-head wood screw
1 piece 3/16" diameter dowel rod, 8" long, or
4 #8 finishing nails
1 piece felt, 7" x 14"
Glue
Colored pencils or paint or enamel of three different colors
Lacquer or varnish
Drawing ink



DETAIL OF PEG POCKET



DETAIL OF PEG POCKET COVER- 18 GAGE BRASS



It advertises the school shop every time it is worn

Concho Belt and Buckle

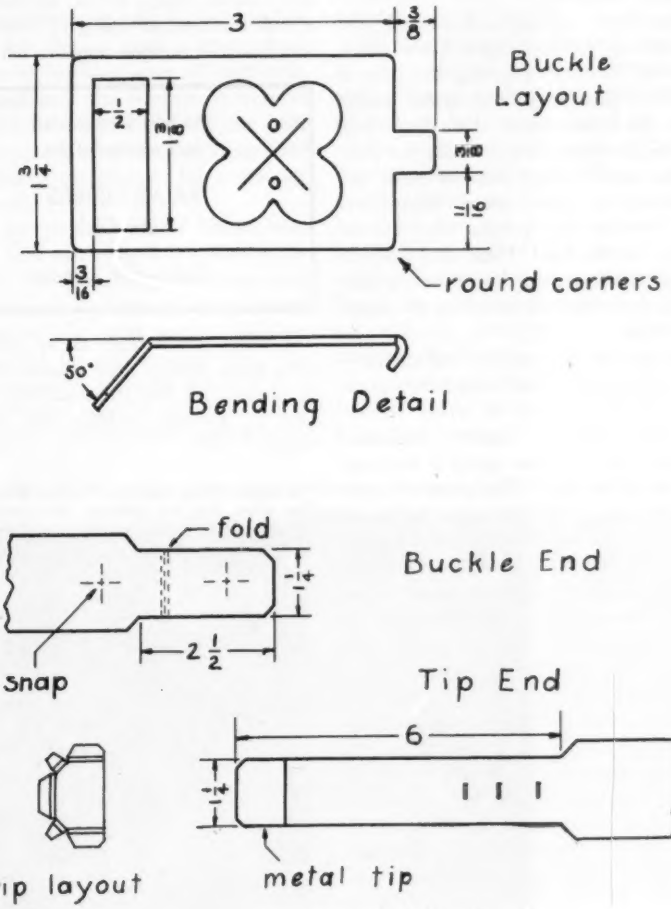
By Everett V. Traylor

Adel, Iowa

A CONCHO belt is not only a project that eighth-graders enjoy making; it is a project that serves to advertise the work being done in the shop every day the belt is worn in school. Not only that, the youngsters learn many metalworking processes in making the project. And, added to these advantages, cost is not a large factor in its production.

The processes used in making this concho belt and buckle are: beading (in place of a regular beading tool, use a 5/16" bolt); marking with a cold chisel; filing with a medium, Swiss pattern half-round file; center punching; drilling with a 3/32" bit; smoothing with emery cloth and steel wool; and polishing with a buffer.

The materials needed are a 1¾" leather belt (add snaps if they are not already mounted on the belt), 3/32" x ¼" soft aluminum rivets, and 14-gage aluminum. (We used aircraft-type.)



Before the materials are handed out, an orientation period should be held. Individual measurement for each concho belt is determined by measuring the belt the boy is wearing at the time, or by taking his actual waist measurement and adding 7". The boys can inspect a finished belt to get a general idea of the project. Each boy is then encouraged, but not required, to design his own belt ornament. About 90 percent usually want to do their own designing.

We set the following limitations on designs: Each ornament will be 1½" square. Seven conchos (ornaments) are required on each belt, including the one on the buckle. Each concho will have a chisel mark or marks and each will be beaded at some place. Rivets will be mounted vertically for fastening conchos to the belt. Even with these restrictions, a wide variety of designs usually result.

It is usually advisable, especially if the class is large, for the teacher to cut out the aluminum squares before the class meets. Enough extra ones should be cut to take care of those ruined. (Of course, don't advertise the fact that you have extra ones.)

Then the work starts with transferring the designs the students have made to the small metal squares with a scriber. A teacher-demonstration on the use of the file in shaping the design, marking with the chisel, beading, center punching, and smoothing will tend to eliminate most mistakes in work order—such as trying to make chisel marks over a beaded surface.

When it becomes time to drill the rivet holes, we have a student demonstrate the placement of the conchos on the belt as they will be when finished. He lays out the belt on a long piece of scrap wood, then drills conchos and belt for rivets at the same time. It is important to mark the order arrangement on the

(Continued, top of next page)

back of the concho and also on the belt.

After the ornaments are smoothed and polished, they are ready for riveting. The best procedure is to insert the rivet through the belt from the back and peen the rivet from the concho face. If done carefully, the rivets will add to the appearance of the belt.

Some boys may want their names on the belt in rivets. In this case the conchos are moved closer together and the letters blocked in, then drilled or punched with a leather punch.

Regular belts also can be used in this project if smaller size conchos are used.

In making the buckle for this belt, it is necessary to have heavy-gage aluminum, since there will be considerable strain on small areas. After the shape is cut and partially smoothed, drill a hole to admit a jeweler's saw in the rectangular space which will be sawed out. Then drill holes for the rivets through the concho and buckle. The belt end of the buckle is bent to a 50° angle in a padded vise and the hook of the buckle is bent with a plastic mallet or small ball-peen hammer. After final smoothing and polishing, the concho can be riveted in place, and the belt is complete. ★

Here Is a Way . . .

to publicize your industrial-education program

TV Tribute

A tribute to the field of vocational education by Alex Drier was featured in the program "American on the Go" presented on NBC radio in August. The program, which was a part of the network's coast-to-coast Monitor broadcast, preceded the American Vocational Association convention in Boston.

Association Sponsors Exhibit

The Los Angeles Industrial Education Association acquaints parents and friends of students with the work being done in the school shops in the area by sponsoring a craftsman's exhibit at the California Museum of Science and Industry.

Last spring the second annual exhibit was held, with Ralph Demmler, instructor at Los Angeles High School, as general chairman of arrangements. More than 20,000 persons saw the exhibit, which displayed the progress of industrial arts from the elementary school through the junior colleges. Financial sponsors are several industrial groups throughout the city.

Boy interest is high

Drag Plates

By John Kluz

Reavis High School, Oak Lawn, Illinois

Finished drag plates and their patterns mounted on match plates. This project's cost is low.

THE making of hot-rod drag plates is a project with considerable boy interest, and the plates, when made in the school shop, are much cheaper than those which can be purchased from an industrial foundry.

Many boys of high-school age are interested in hot-rod clubs. These clubs serve the purpose of giving the boys a chance to have drag races under conditions which are safer—for themselves and others—than illegal racing on public highways. Not all hot-rod clubs are organized for speed alone. Many perform services for people who are in trouble on the road. Thus, this project, in addition to having boy interest, may help to encourage membership in one of these clubs.

The project has another advantage—it is economical. Many metal-shop projects cannot compete in price or appearance with a similar industrial product. Here is one project that can compete successfully. The price of a pattern for a drag plate from an industrial foundry is about $15.00, and the price of each plate runs $2.00 to $3.00. In the school shop, a pattern costs about $1.00. The cost of each plate is $.60, not including paint.

The plate part of the pattern is made from hardwood about 5/16" thick. The depression on the plate is milled out about 1/8" deep with a fly cutter. The draft is ground on the toolbit in the fly cutter. The draft, about 5° on the outside edge, is made on the disc sander. The symbol is carved from linoleum. The letters are pattern letters purchased from a local foundry supplier. The letters and linoleum symbol are glued to the hardwood plate with waterproof glue. The letters and symbol can be removed later and the plate can be used again.

After gluing, the letters, linoleum symbol, and the plate are sealed and lacquered to give a smooth finish. When the boys decide to make a large number of drag plates, the pattern is mounted on a plywood match plate with runners and gates made from dowel rods or old broom handles. When the pattern is mounted on a plate, the boys can make two to three molds in an hour's time.

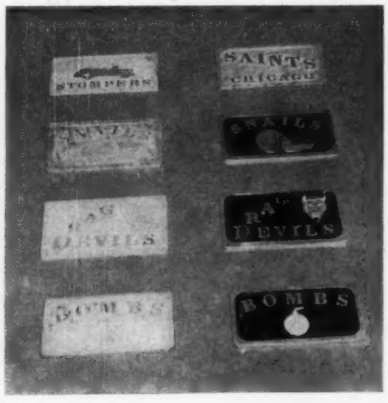
After the casting is poured and taken out of the sand and the gates cut off, it is sanded on a belt sander. By sanding the face, the edges, letters, and symbol are polished. The boys then paint the background to suit.

Members of the club who are taking graphic arts, print membership cards and courtesy cards. If you are helped by a club member, he will give you a courtesy card. A sample appears below:

> You have been assisted
> by a member of the
> **VALVE LIFTERS**
> **Auto Club**
> Oak Lawn, Illinois

I think you'll find, as we have, the drag-plate project has natural interest, is economical, and illustrates the principles of pattern making and foundry work. ★

The darker items here are finished drag plates. The other five are patterns for these plates.



Notes on

A Visit to Mr. Brown's Industrial-Arts Class

By Andrew K. Ault

University High School, University of West Virginia, Morgantown

RECENTLY I visited an industrial-arts class taught by Mr. Brown as part of a general-shop program. His manner of conducting the class was impressive. Impressive enough so that immediately afterwards I jotted down what he did and how he went about doing it. Here are my notes:

"About fifteen minutes before the class started, Mr. Brown made a hasty check of all areas, making sure all materials, tools, machines, and equipment were in place and in order. Following the bell, the youngsters started streaming into class, each proceeding to his respective work area.

"Mr. Brown, once all of his students were at their places, took his place in the center of the shop—slightly to one side so that he had a clear view of everyone. Oblivious of the good natured kidding that carried on all around him, Mr. Brown appeared to make a last-minute mental check of what he was about to do. The look of contemplation soon left his face and he successfully 'eyed' the class to order. Following a hasty attendance check and announcement of a foreman's club meeting that day at 12:30 P.M., Mr. Brown started things off by calling on a class member to review the safety procedures discussed in the previous day's lesson on 'How to safely operate a grinder.'

"In the following two minutes Mr. Brown explained the need, importance, and mixing procedure for a thin mixture of shellac. And he illustrated his point with a lamp that was streaked from an improper application of shellac.

"Mr. Brown then got to the work at hand. He surveyed the class hastily and learned one lad needed emery cloth; another boy asked for help to 'groove' a board. He called on the class to help the lad with the emery-cloth problem, instructed the boy needing help grooving to study the problem for a few minutes from his text—and that he would later help him personally—and calmly dismissed the gathering so it could disperse for work.

"As soon as all students were busy at their projects, Mr. Brown busied himself helping Vaughn, the student who asked for assistance in grooving a board. All the while he was with Vaughn he studied the rest of the students, always looking for somebody who needed help. He left Vaughn shortly and went to John in the foundry area who had run into a problem. Next he moved over to the forging area to see the boy who was having trouble annealing a chisel. The lad's pal, George, knew the answer to the problem so Mr. Brown assigned him to help.

"All during the period Mr. Brown circulated among the students. To each he had something to say; a word of encouragement to one, a compliment to another, a little help to still others."

He had apparently settled down to the regular class routine himself. So I turned my attention to students.

(*Continued on page* 27)

"An industrial-arts general shop can be an educational experience of the first order for the student. The teacher, too, will realize immense satisfaction."

Our Eye-Protection plan is "PAYING OFF"

Wear Your Safety Glasses at All Times

By Earl E. Tatro

Bronx, New York, Vocational High School

ACCIDENT prevention and safety for our pupils should be, and generally is, a major concern of every shop teacher. From the moment new pupils enter our shops until the day they leave us, we feel a deep responsibility for their safety and welfare. We go to great lengths to provide an environment as free of physical hazards as is possible.

For the most part we have been quite successful in such things as drawing up safety rules and regulations, guarding machinery, teaching safe methods, and keeping tools and equipment in what—we like to believe—is a safe operating condition. All of these things help in our accident-prevention work but do not eliminate the hazards that will always exist as long as we have human beings working around power-driven machinery. We have to recognize the impossibility of eliminating every single hazard and try to overcome these "bound-to-exist" hazards by teaching pupils correct methods of workmanship and at the same time develop "safety-conscious" attitudes and habits.

Because it is physically impossible for any one instructor to keep his eyes on 20 to 35 pupils at all times, and knowing that beginning pupils especially have no knowledge of existing hazards or how to deal with them, we need more than ever to take advantage of all protective safety devices that will reduce, prevent, or eliminate personal injury.

As far as eye-protection is concerned, there probably isn't a shop teacher in the business who is totally unaware of the importance of eye protection and the constant need for preserving the eyesight of his pupils. Talk to any shop teacher about safety and somewhere along the line he is able to relate one or more incidents from his experience that concerns eye injuries or loss of eyesight. Why, then, must a pupil suffer injury or loss of his eyesight before the importance of adequate eye-protection measures is recognized, instituted, and enforced in all of our school shops and even in our science laboratories?

In October, 1955, our machine-shop department was selected by our vocational-high-school division as one of two school shops in New York City to set up an experimental program of 100 percent eye protection.

The idea was by no means a new one. Such eye-protection programs have been in existence for years in many industrial concerns and in some few school systems throughout the country. (See SCHOOL SHOP, March, 1956, James E. O'Neil, "Sight-Saving Program.") Notable among the industrial concerns is the Pullman Company, known as one of the pioneers of sight conservation for it employes.

As a result of our two experimental programs, from October, 1955, through June, 1956, our vocational-high-school division provided sufficient safety glasses so that each machine-shop pupil could have his own pair. Eye protection in all of our vocational-high-school machine shops is now mandatory.

The day has gone when we could hang a pair of goggles near a grinding machine together with a sign which read "Wear Your Safety Goggles" and feel that our obligation to protect the precious eyesight of our pupils had been fulfilled.

Before starting our program we were immediately concerned with the following physical problems:

The title and the inset in the photograph at right are samples (reduced in size here) of the eye-protection signs posted in this shop.

1. Safety Glasses — Types and Sizes.—There are many types of safety glasses available and a great difference of opinion exists concerning whether one type is better than another. We were asked to try a plastic lens with a lightweight, spectacle-type acetate frame at the beginning of our program. We soon found these to be inferior and unsuitable. The plastic lenses scratched too easily and could not be cleaned satisfactorily. We were then provided with a flat-lens, hardened safety-glass spectacle which proved to be more satisfactory. Ultimately we learned that the curved-lens hardened safety-glass spectacle is superior to the above-mentioned types. We also found that three sizes, 22mm, 24mm, and 26mm, would adequately take care of the size problem. Experience has shown that most pupils require a 24mm size.

2. How to Fit and Adjust for Size and Comfort.—This is a problem that merits a great deal of consideration on the part of the teacher if the program is to succeed. Pupils, like adults, object strenuously to wearing safety glasses which slip down on the nose, are cocked at an angle, or pinch the ears.

While we were not opticians, we were able with the assistance and instructions from a representative of a safety-glass concern to learn enough about fitting safety glasses so that we could bend, twist, or otherwise adjust the glasses for a fairly comfortable fit for each pupil.

3. Identification. — For reasons that will be obvious to most shop teachers, it is good practice to have some means of identifying each pupil's safety glasses. After all there is a health hazard involved when a pupil wears another's safety glasses. To eliminate this problem we used a flexible-shaft tool and engraved a number into the nosepiece or bridge of each pair of safety glasses. As the safety glasses were fitted and issued, this number was entered in the record book opposite the pupil's name. Occasionally we found that a pupil will leave his safety glasses somewhere in the shop and the number quickly helps identify the owner.

4. Distribution, Collection, and Storage.—Some teachers may shudder to learn that our system requires daily distribution and collection for each class. However, when properly set up and a monitor is assigned, it's not nearly as bad as it sounds. Some teachers prefer to let pupils assume the responsibility of keeping their safety glasses throughout the school term as with textbooks. We felt that this procedure would result in a greater loss and damage than would daily distribution and collection. Then, too, there is always the problem of the pupil who puts the glasses in his pocket, takes them home, and forgets to bring them in the next day.

To provide adequate storage facilities, we requisitioned small portable cabinets containing 32 plastic drawers, each large enough to hold a pair of the glasses. One cabinet is assigned to each class. Each plastic drawer is numbered and corresponds to the pupil's tool-check number. A class card containing the names, tool-check numbers, and the number of each pupil's safety glasses is taped to the cabinet so the monitor can quickly check the glasses "in" or "out". At the end of each class session the monitor padlocks the cabinet and puts it away.

In each class cabinet we keep a few extra pairs of safety glasses which are handed out by the monitor when visitors come into the shop.

5. Cleaning. — Unless some specific means is provided for cleaning the safety glasses, pupils will go to any length to avoid wearing them. In many instances we have found pupils wearing grease-covered, dirty glasses that were actually a hazard because visibility was impaired. In planning for this eventuality, we decided that it would be necessary to provide the best means possible and make it attractive enough so that pupils would want to use the cleaning facilities. Industry uses various types and sizes of cabinets, mounted on the wall at convenient locations throughout the plant. These cabinets contain cleaning fluid which can be sprayed on the glasses and cleaning tissues which can be pulled from an opening in the cabinet. A waste can under the cabinet provides a place to deposit used tissues. The monitor in charge of safety glasses has the responsibility of placing cleaning fluid and tissues in the cabinet each day at the beginning of the shop session.

Top: A monitor issuing safety glasses before the class starts work. Note individual drawers. Bottom: Students cleaning safety glasses with fluid and tissue that are handy. Clean glasses are a "must" for this program to be successful.

KEEP SAFETY GOGGLES CLEAN AT ALL TIMES

6. Repairs and Replacements. — The only major repair problem concerns the replacement of screws that hold the temple pieces to the frames. These have a tendency to loosen and drop out occasionally. We found it necessary to requisition a supply of these screws and they are issued to pupils as required. During the past year not more than 10 or 12 have been needed.

For those pupils who wear prescription eye glasses we recommend that they purchase hardened safety-glass lenses. One instructor reports that he has received 100 percent cooperation from parents whose sons wear prescription lenses, and that approximately 20 percent of his students preferred to purchase their own safety glasses. This is another instance where a little educating on the part of the instructor goes a long way towards solving a problem.

We drew up and mimeographed ten simple rules for using and wearing safety glasses. We included a statement to be signed by each pupil, as follows:

To All Machine-Shop Pupils

In order that no pupil in our machine-shop department might suffer an eye injury, or damage to, or loss of an eye, we are providing each pupil with a pair of safety glasses.

To make our program a success, it will be necessary for you to follow the rules below very carefully.

1. Our 100 percent eye-protection plan requires that you must wear your safety glasses at all times while in the machine shop.

2. You will be fitted with a comfortable pair of new safety glasses which you will use and care for during your stay in the shop.

3. Your safety glasses are to be put on at the beginning of each shop session and are not to be removed until the end of the class session.

4. You are responsible for the care and proper use of your safety glasses. Damage or breakage due to your carelessness will have to be paid for.

5. You must never use another pupil's safety glasses. This is unsanitary and unhealthy.

6. Dirty safety glasses can be a hazard. Keep yours clean at all times by using the cleaning fluid and tissues provided.

7. Safety glasses are not to be taken from the shop. They are to be turned in at the end of your shop session and stored in a special cabinet drawer bearing your tool-check number. Each pair of glasses is numbered so you can be certain of getting the same pair each day.

8. If you find that your safety glasses do not fit comfortably or the lenses become scratched, report this to your instructor.

9. All visitors to our shop will be required to wear safety glasses during their stay in the shop.

10. Pupils leaving the machine-shop course through transfer to another shop class, leaving school, or on graduation, must return the safety glasses just as they would textbooks or other school property.

The above rules are to be kept in your notebook. Fill in the bottom part, tear off at the dotted lines and hand to your instructor.

I fully understand the 100 percent eye-protection plan is for my benefit so that my eyesight may not become impaired or lost through an accident in the shop. I will take good care of the safety glasses and return them in good condition. I will pay for any damage or breakage due to my carelessness.

Signed _____Class _____ Date _____

Check Number _____ Glasses Number _____

Another important point that we carefully considered had to do with teachers wearing safety glasses. Pupils are quick to notice when the teacher doesn't wear safety glasses. To avoid criticism along this line it was necessary to have prescription lenses made of hardened safety glass placed in the same type of frame that the students wore. It is only fair to assume that teachers will be willing to wear similar eye protection while in the shop.

Information concerning the cost of such a program may be of interest to those contemplating a better eye-protection program. The prices stated may vary somewhat in different parts of the country and may have changed since our program was set up but they should be approximate for estimating such costs. They are: safety glasses, $1.30 to $2.45 ea.; storage cabinet, $15.95 ea.; dispenser cabinet, $12.50 ea.; cleaning tissues, $11.95 (carton of 75 pkgs.); cleaning fluid, $8.45 gallon; replacement screws, $2.00 per hundred.

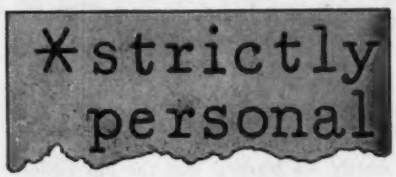
To equip a class of 30 pupils, the minimum total cost for the first school year would be approximately $90.00. This amounts to $3.00 per pupil. If extra safety glasses are needed for replacement purposes, the additional cost would have to be added to the above figures.

We have found that a yearly supply of cleaning fluid and tissues costs us about $15.00. In the two and one-half years that our program has been in effect we have consumed one carton of cleaning tissues and two gallons of cleaning fluid. Class registers during this period have varied from 75 to 100 students each term.

Having equipment to set up such a program is not a guarantee the program will succeed. Pupils have a tendency to forget and take the easy way out. This means the program is likely to slip unless the instructor works constantly to keep it alive. We use various methods to keep the pupils aware of the necessity for protecting their eyesight. We had cards printed which we posted about the shop stating that the shop has 100 percent eye protection. These are also placed in the front-door windows of the shop to remind constantly both students and visitors.

Safety posters which we obtain from a number of sources are posted on our safety bulletin board and they are changed frequently to create interest and keep the subject alive. We also use a color safety-graph entitled "Wearing Goggles" which can be obtained from the National Safety Council ($8.00) and is most useful in instructing new classes and as a review for the upper-term classes when problems arise. For the few chronic violators of our rules we find that entering a demerit in the record book whenever a violation is found helps prevent future errors.

In spite of the added work involved, we feel that our program of 100 percent eye protection has real merit as a sight-conservation measure and we believe that others will find it valuable. It is our hope that never again will we have to write out an accident report that involves an eye injury. As one shop teacher stated, "Anything new requires effort, and the success of any plan that goes into a school shop will depend 100 percent on the shop teacher, his zeal, and his interest in the project." ★



FRED C. WEBER has succeeded HORACE M. JELLISON, retired, as executive director of vocational and industrial education, Akron, Ohio, public schools.

WILLIAM J. MICHEELS, chairman of the department of industrial education, University of Minnesota, is now in Indonesia as senior advisor on a team of technical educators from Dunwoody Institute to assist the government of Indonesia in reviewing the progress of technical education and making recommendations for the future development of vocational and technical education.

CARL A. MOELLER, formerly of Wayne State University, Detroit, Mich., is now assistant professor in the industrial-arts department at North Carolina State College, Raleigh.

RALPH K. BEAMER, assistant professor of vocational-industrial teacher education at the University of Pittsburgh, has retired after 18 years in this position.

WALTER B. JONES, director of vocational-teacher education at the University of Pennsylvania, Philadelphia, is on a year's leave of absence to work as education consultant with the European Productivity Agency, a branch of the Organization for European Economic Cooperation. His assignment is mainly in Italy, with headquarters in Rome.

DONALD F. PETERS of Alexandria, Va., has been named associate professor of industrial arts at New York State College for Teachers, Buffalo.

MURRAY D. THORNBURG, formerly associate professor of industrial education, North Carolina State College, Raleigh, is now program specialist for trade and industrial education, U.S. Office of Education.

ROBERT D. HELSBY, formerly acting director of the industrial-arts division at New York State Teachers College at Oswego, has been named director, succeeding GORDON O. WILBER, retired, who is now organizing industrial-arts programs in the Philippine Islands.

EBERHARD THIEME has replaced GEORGE RENTSCH as consultant in in-

dustrial arts for Rochester, N.Y., public schools. Mr. Rentsch is now directing the equipping of Rochester's new East High School.

GEORGE A. PARKINSON, formerly vice-president of the University of Wisconsin, Milwaukee, has succeeded WILLIAM F. RASCHE, retired, as director of the Milwaukee Vocational and Adult School.

CHARLES GINN, JR., has been named consultant in industrial arts for the Georgia State Education Department, Atlanta.

BERNARD F. RAPPAPORT has been named director of industrial arts and vocational education for the Levittown, N.Y., public schools.

CARL C. CUMMINS, professor of industrial arts at San Diego State College, Calif., has been appointed head of the new technical-arts department at California State Polytechnic College, San Luis Obispo, Calif. The new department includes industrial-arts teacher training.

PETER F. CHRISTIANSON, assistant professor of industrial education, and GERALD SCHEMANSKY, instructor of printing, are included among the new faculty members at Stout State College, Menomonie, Wis.

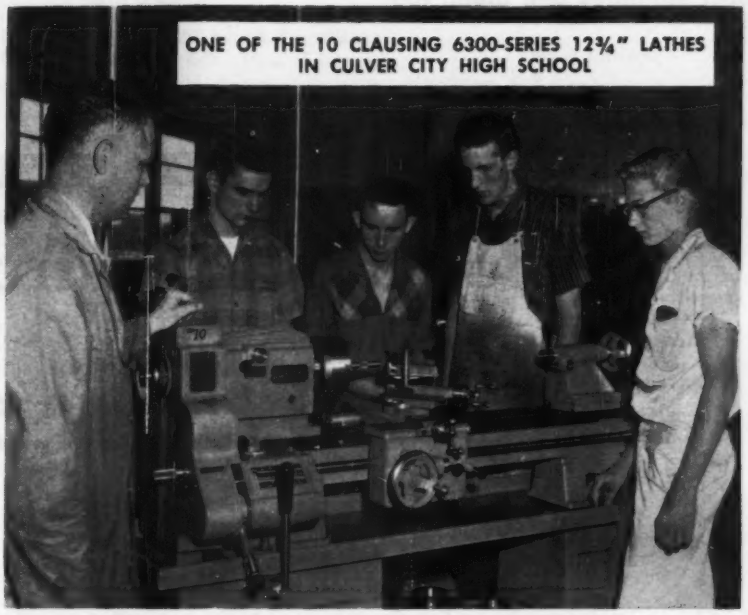
S. K. WICK, formerly acting state director of vocational education for Minnesota, is now state director. He succeeds HARRY C. SCHMID. REYNOLD ERICKSON, formerly guidance director at Hinckley, Minn., High School, is now assistant state supervisor of occupational information and guidance.

New faculty members at Ball State Teachers College, Muncie, Ind., include WILLIAM T. SARGENT, formerly professor of industrial arts at Northern Michigan College, Marquette; CLAUDE E. RIETH, formerly in charge of graphic-arts instruction at Muncie Trade School; and KENNETH E. POUCHER.

PHILIP S. VAN WYCK, senior advisor of the Government Technical Institute, Insein, Burma, died Oct. 7 in Rangoon, Burma, after a brief illness. Mr. Van Wyck, who for the past four years was leader of a group of advisors sent by Dunwoody Industrial Institute to Burma under the Ford Foundation, was formerly acting director of the Vocational and Technical School at Tacoma, Wash.

B. H. GRAEBER has been appointed director of the Iowa Vocational Education program by the Iowa State Board of Public Instruction.

ALFRED S. LINTHICUM, formerly with Douglas Aircraft Company, has been named assistant state supervisor, trade and industrial education, Virginia State Department of Education, Raleigh. ★



ONE OF THE 10 CLAUSING 6300-SERIES 12¾" LATHES IN CULVER CITY HIGH SCHOOL

"CLAUSING Lathes are RUGGED, ACCURATE and DEPENDABLE"

HERE'S PROOF OF PERFORMANCE: *"Clausing Lathes have proved to be excellent in our shop teaching. They're rugged, accurate and dependable, and make it easy for the instructor to teach."*

D. DAUGHHETEE — *Culver City High School, Culver City, California*

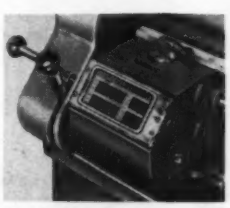
D. Daughhetee's endorsement is typical of the many we receive. Instructors everywhere report Clausing lathes set the standard for safety, rugged construction, ease of operation, and VALUE!

Consider these features: Headstock, apron and quick-change are *totally enclosed* . . . fingers can't get into these danger zones, nor can dirt or chips. All gears and shafts travel in bath of oil. *All* controls are *outside* the machine. Spindle nose is tapered key-lock . . . eliminates danger of chuck run-off on braking or reversing.

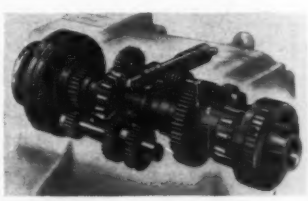
Flame hardened bed ways for longer wear are standard equipment *at no extra cost.* Spindle turns on Timken "Zero-Precision" tapered roller bearings. Lead screw has easy-to-replace shear pin.

Underneath drive . . . no exposed belts or pulleys. Heavy-duty ball bearing countershaft. Two V-belts drive the spindle . . . belts are outboard for easy replacement.

Get *all* the facts about Clausing 6300-series lathes. *Write for illustrated literature today.*



Quick-change box, too, is totally enclosed and gears and shafts turn in bath of oil . . . another important safety and long-service-life feature exclusive with Clausing in lathes of its class.



Enclosed construction of headstock provides greater rigidity, safety . . . longer service life. All gears, shafts and bearings travel in a pumped bath of oil.

CONDENSED SPECIFICATIONS

Swing over bed	12¾"
Between Centers	21½", 33½", 47"
Hole thru spindle	1⅜"
Thread range	54 selections, 4 to 224
Motor recommended	1 or 1½ HP, 1 or 2 speed

CLAUSING

CLAUSING DIVISION
ATLAS PRESS COMPANY
12-122 N. PITCHER ST., KALAMAZOO, MICHIGAN

Earth satellites use them, too

Silk Screening a Printed Circuit for a Test Instrument

By William M. Bowers and Rex Miller
New York, State College for Teachers at Buffalo

ROCKETS, guided missiles, and earth satellites are so much in the public eye that certain of their components make excellent material for teaching purposes. Printed circuits are in this category and, of course, are used extensively by industry. Hence, this project is particularly appropriate for today's industrial education.

This project is not beyond the level of capabilities found in high-school electricity shops. Furthermore, it integrates the graphic-arts department—for the silk-screen process—with the electricity-shop phase, an arrangement that not only is novel but very desirable from the point of view of industrial education.

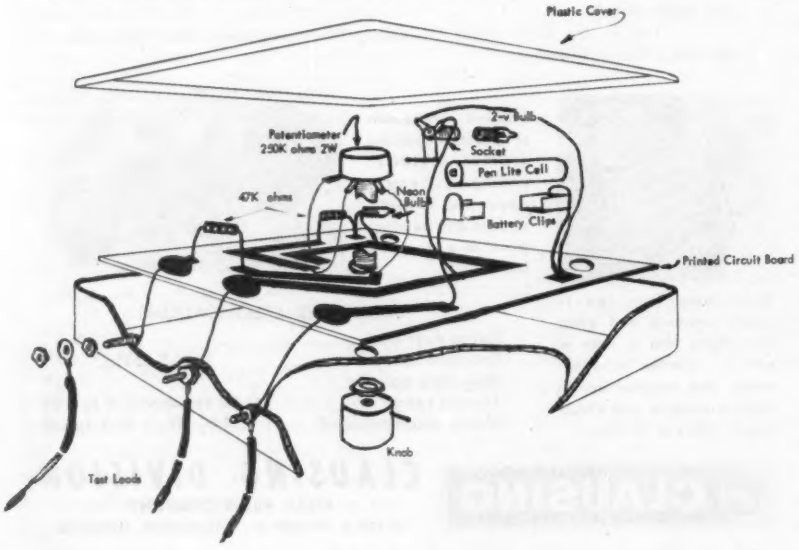
This project is an extinction-type neon voltmeter and continuity checker, using the printed circuit to eliminate wires. This project, furthermore, was developed and produced in a school shop, using mass-production techniques.

The voltmeter measures ac or dc, from 60v to 600v. It indicates whether the voltage is ac or dc without manipulations or switching. If both sides of the neon bulb glow, it is ac. If only one side of the bulb lights up, it is dc. The continuity checker is a visible type, employing a light bulb to indicate a short or a continuous circuit, adding to the functional value of this multipurpose instrument.

It can be used to check voltages in radios, television sets, and other electrical devices. Its application, you will have already surmised, is as broad or as narrow as is its maker's imagination.

A voltmeter continuity checker (right) in use. Note its size in relation to its user's hands.

An exploded view of the voltmeter and continuity checker showing how the parts fit over the circuit.



The steps for making this project follow:

1. Draw the circuit of the voltmeter-continuity checker (Fig. 1).
2. Photograph the drawing.
3. Develop the negative and make a positive print.
4. Prepare the silk-screen frame and place the picture of the circuit on the silk.
5. Print the circuit on the Copperclad using acid-resistant lacquer with the silk-screen process.
6. Make the etching following this procedure: (*a*) Use a ferric chloride solution, 40 percent Baume at 180° F. (*b*) Agitate the solution during the etching process. The etching can be done either by spraying the solution or dipping the Copperclad in the solution. (*c*) As soon as the copper disappears, wash off the solution under running water. (*d*) Remove the acid-resistant lacquer from the Copperclad with denatured alcohol, turpentine, or lacquer thinner.

The photographic silk-screen process produces a sharper and more even-appearing line than the direct silk-screen process. In a more complicated printed circuit this could be critical. In this

project, though, the spacing between the lines is relatively coarse so that nothing is lost by using the conventional method although we used photographic silk-screen printing.

7. Drill 3/8" holes for the potentiometer in the plastic box, 1/16" holes for putting parts and wires on the Copperclad, and three holes in the front of the box for three #6-32 machine screws.

8. Solder the parts to circuit board.

9. Make the knobs and the pointer from 1" dowel rod and drill holes in the center of the dowel to fit the potentiometer shaft and press fit. Fix a nail to the knob after it has been painted.

10. Assembly precautions and testing procedures that should be adhered to follow. (*a*) Do not over-heat the copper (it will come loose from the board if it is overheated). (*b*) Double-check the solder joints and reheat the cold joints. (*c*) Intentionally short circuit the common and continuity side to see if the light burns. (*d*) Do not tighten the potentiometer nut too tightly or it will crack the plastic box.

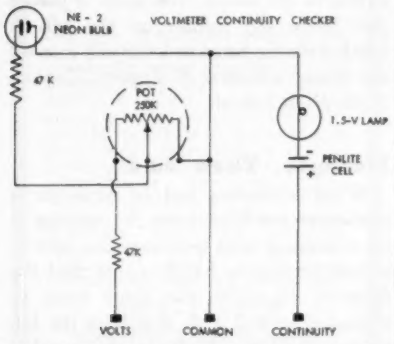
11. Calibrate the voltmeter portion of the tester. The variac (60-v to 500-v ac) is connected to the power supply; a regular voltmeter is connected to the variac; and the neon voltmeter, in turn, is connected to the regular voltmeter, in parallel. Turn the potentiometer completely clockwise and adjust the voltage from the source to 60v. Turn the knob clockwise until the light goes out and mark this point 60v. Continue this procedure until the range has been calibrated. Increase the voltage source 10v before repeating so that the meter will read in terms of 10-v intervals. Calibrate it for both ac and dc.

12. Make the test leads whatever lengths best suit the user's needs.

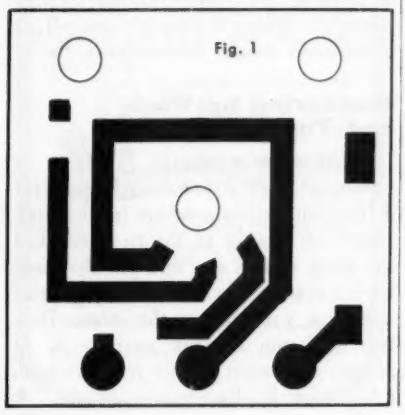
There, now, you have an extinction-type voltmeter and continuity checker using a printed circuit—the kind that industry and the scientists use today.

Bill of Materials

2 Resistors: 47-K Ohms, ½-w, ±10%
1 Potentiometer: 250-K Ohms, 2-w (linear taper)
1 Neon bulb: Ne-2 or Ne-51
1 Lamp holder: screw-base socket
1 Lamp, flashlight: screw base, 2v
1 Penlite cell: 1.5v, dry cell
2 Penlite-cell holders: made to size
3 Test leads: length to suit, flexible wire
3 Soldering leads: brass or steel, 3/16" hole
3 Machine screws: No. 6-32, brass or steel
3 Phone tips: for use with test leads
1 Knob: wooden dowel, 1" dia. x ¾"
1 Box: plastic sandwich box
1 Printed circuit: 4" x 4" Copperclad ★



Above is the schematic drawing of the voltmeter and continuity checker described in this article. Below is a drawing of the printed circuit ready for silk-screen processing on Copperclad.



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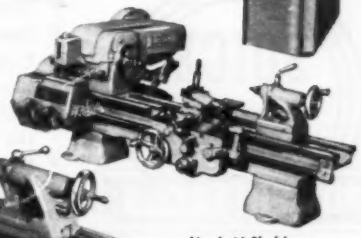
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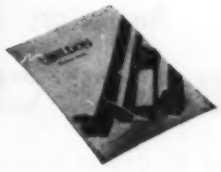

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The Versatile Vacuum Cleaner

We have found that discarded household vacuum cleaners are virtual gold mines of parts which can be adapted to the shop organization. Some of the things for which we have used them include the following:

Making adaptors for the motor and fan unit to be connected to our band, disc, and belt sanders, and reconnecting the dust bag to pick up the sander dust.

Removing the housing and using the motor and fan for blowing chips from a planer into a catch box.

Providing a shoulder strap and accessory tube for a portable cleanup unit which a student can carry on his back. Can be used for cleaning inside of machines and other inaccessible parts and places.

Using the long electrical cable (25′ to 50′ long) for an extension cord.

Using toggle switches for various purposes.

Using plastic or aluminum tubing handles for various projects.

Using the motors for projects in portable saws, power planes, routers and shapers, and flexible-shaft units.—*Don Kinnaman, Camelback High School, Phoenix, Ariz.*

A Three-in-One Stand

The jointer stand, shown below, was built in our shops to provide a stand, motor support, and chip bin, all in one.

The chips fall directly into the bin and may be removed through a side door. This keeps the chips in one place and easy to dispose of without having to clean up each time after using the jointer.

On this jointer an automobile choke cable also was used as a remote control switch to the motor. The knob is placed just below the jointer on the left. A touch with the hand or knee will turn off the motor.—*Robert S. Tupper, Canton, S. D., High School.*

Multiply, Then Add

When a student has to duplicate a particular machine screw by making it on a lathe, it isn't necessary for him to search through a handbook to find the diameter to which the blank must be turned if he will only memorize the following formula: Multiply the number of the screw by .013 and add .060 to the product. For example: A #2 screw is 2 times .013 plus .060 or .086.—*Harry J. Miller, Gillespie Junior-High School (on leave), Philadelphia, Pa.*

Numbering by Work and Turn

Often when a printing job is to be numbered there is not enough space for a typo numbering machine in the form. Here's an answer to the problem: Cut the stock double size and put the numbering machine so that when you print one page you number the other. Then turn and run through again.—*L. E. Hayes, Roosevelt Junior-High School. Charleston, W. Va.* ★

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Diamond Dust

Abrasive comments from that doughty Scot, Tom Diamond, former head, Department of Vocational Education, University of Michigan, Ann Arbor.

Bawbees Are Not All

SANDY MACKAY is a Scot. Strangely enough, too, he is a shop teacher. With such a name, the first of these statements should be obvious. However, it is surprising to find one with his national characteristics belonging to the teaching profession when the financial rewards for teaching make it unnecessary for the teacher to lie to the internal revenue department in order to remain in the lower income bracket.

Sandy did not choose to be a teacher. He found himself in the profession as a result of the friendly advice of a guidance expert who had no teaching experience but who thought that the industrial-arts course was the easiest one in college. Our expert was of the opinion that Sandy's mental equipment was rather limited, and that the literary college or the engineering school would tax his ability beyond its elastic limit.

When Sandy had negotiated all of the hurdles erected by the faculty to discourage him, he finally graduated and presently he found that he was stuck in a classroom. His salary was $5000 a year for ten months. He had two months in summer in which he could earn more money, go to school, or travel with his family. In addition, he could count on a ten-day recess at Christmas and another at Easter—with pay. There were no lay-offs to reduce his income, and there were no shortages of material or cancellations of orders. Material to work on was always available, so the danger of the school shutting down was negligible. In short, Sandy had a steady job and, while his take-home pay was not fantastic, it was regular, and it was vastly more than his predecessors received 20 years previous.

But, Sandy thought, industrial workers earn much more than I do. This may be true when the rate per hour is considered. However, when deductions are made for lost time, we wonder if the amount they receive for ten months is much greater.

As we reflect on Sandy's unsettled frame of mind and review the many advantages of teaching, we believe that the profession is not as undesirable as the gripes emanating from some of our colleagues would seem to indicate. If the question is considered objectively by setting forth in one column "The Advantages" and in another "The Disadvantages" of teaching, we conclude that the weight of evidence is on the side of the "Advantages."

We believe that evidence could be found to support the claim that the number of teachers who quit teaching to enter industry—with its greater financial reward — is relatively small. We know, too, that the number of teachers who have been teaching for 20 or more years is large. And we are quite sure that, notwithstanding numerous complaints, these teachers remain in the profession because they are intelligent enough to realize that the satisfactions they get out of teaching make their jobs worthwhile.

The exodus of teachers to industry, that we hear so much about, exists mainly in the minds of some teachers who are constantly threatening to change, but seldom do. And, as we observe this group, we find that it is composed mainly of individuals who have had no experience in industry. Only on rare occasions do the teachers who have had this experience return to industry. If and when they do, it is likely to be because they find they are unsuited to a teaching job.

It is not our intention to minimize the need for raising teachers' salaries. Rather is it our purpose to emphasize that teaching is a worthwhile profession. While present salaries may not compare favorably with those prevailing in some other occupations, teaching has many advantages which are not found in other fields. It presents a constant challenge for the person with ambition; it provides the satisfaction of helping mold the lives of young people; and it enables the teacher to make a significant contribution to the welfare of society.

These, added to the many other advantages mentioned, make the profession one in which the teacher can take pride. Let us rejoice, therefore, that we are fortunate indeed to belong to it, while at the same time, we pursue with vigor the campaign to bring its financial rewards into harmony with the importance and dignity of the task.

We mentioned at the beginning that Sandy is disgruntled because he believes that his salary is below par. We hope you will excuse him for his attitude, because he is merely exercising his national tendency to count the bawbees. We note that he is still teaching and, if our information is accurate, has shown no inclination to resign. ★

A Visit . . . . *from page 17*

"I spotted a young man busy sketching. Asked to see what he was doing. Noted he was jotting down the procedure he was following to develop his job. The sheet had a place to list tools, equipment used, and figure the cost. All of this was in addition to a free-hand sketch of the job. The sheet was headed 'My Job Plan.'

("Brown later explained this was one of his techniques for teaching pupils to plan and think. He added that early in the term he showed his class how to plan a typical shop project and that they discussed the value in planning construction work.)

"Shortly, one of the boys shouted, 'Clean Up.' Five minutes of those remaining were devoted to putting away books, tools, materials, and supplies. Some turned to dusting off benches and machines. Brooms came into play as others started sweeping. Sinks were washed. Everyone was at his clean-up assignment. Soon the place was, shall we say, 'shop shape.' This all happened in less than five minutes. Each area had a lad to make a final check. Mr. Brown checked with these 'foremen' who reported everything secure. He then pulled from his shop-coat pocket a pair of pliers that the foreman had no knowledge of being there. All laughed. He had his play for the day and the moral had been learned.

"All left shop quietly when the dismissal bell rang.

"Mr. Brown teaches mechanical drawing, woodworking, forging, foundry, bench metal, and printing. Quite a load! And it's a first-year general-shop course.

"In his second-year class Mr. Brown teaches pottery, electricity, electric welding, gas welding, and advanced work in metals, drawing, and wood areas."

I stopped taking notes because I decided the best thing for me to do was to have a good, long chat with Mr. Brown. I invited myself to lunch with him. I don't remember what we had to eat but here are the rest of my notes:

"An industrial-arts general shop can be an educational experience of the first order for the student. The teacher will, too, realize immense satisfaction from a job 'well done.'

"The educational objectives of industrial arts can be more adequately realized in a general shop.

"The educational opportunities offered in a general shop are not available in other types of shops.

"To successfully teach industrial arts in a general shop, the teacher must have versatility of skills, ability to plan and organize, the right temperament, and the ability to understand young folks.

"A thorough understanding of the philosophy of industrial arts and the general shop is a 'must.'

"Each industrial-arts teacher must be dedicated to the cause of helping all youngsters—regardless of their individual abilities and to guide these young folks as far along the paths of their choosing as they desire and are able to go.

"Teaching industrial arts in a general shop is no easy task. The cooperation, understanding, and help of all those involved, however, can make it a satisfying experience." ★

"Mr. Babcock, I'm afraid we'll need the newspaper now."

"What's New?" they ask B-G

At the many conventions where B-G exhibits, it has been commonplace to have visitor after visitor come to our booth and ask "What's New?" And it's understandable—for B-G as one of the oldest and largest suppliers of industrial arts and vocational education equipment and supplies has lead in introducing "What's New?"

The very "newest of the new", however is something not for sale. It's the highly prized AVA Citation, shown above and in the top photo being awarded by Lowell A. Burkett, AVA Asst. Exec. Sec'y to B-G's Salesmanager Chuck Clawson at the recent Buffalo convention.

And speaking of conventions, B-G has been exhibiting at Industrial Arts, Vocational Education, School Business Officials, School Administrators, School Board and Fine Arts conventions—at both the national and state level, more than 40 a year for more than 25 years... and all to the end of keeping you abreast of new products, and time-saving methods that are constantly being introduced in Industrial and Vocational Education.

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happenings in industrial education

Plan Tech Institute

THE Kansas City, Mo., Board of Education has earmarked approximately $3,000,000 for the construction of a technical institute in Kansas City.

Part of the planning for the new project consists of an occupational survey of the metropolitan area. This survey, sponsored by an advisory committee composed of local leaders in business, industry, labor, and civic organizations, is being conducted by members of the city school system in cooperation with the State Department of Education, the University of Missouri, and the State Division of Employment Security. Members of the U.S. Office of Education helped with initial planning.

Final reports of the study are expected to be available early in 1959.

New Training Course

FIRST students were enrolled this fall in the newly authorized program of industrial-arts education at the Norfolk Division of the College of William and Mary in Virginia. The industrial-arts course, leading to a BS degree in secondary education, was authorized by the Virginia State Department of Education in 1956.

The program will offer complete work in the major industrial areas of communications, manufacturing and construction, and power and transportation. Professional courses in education and psychology, industrial arts, teaching methods, and shop management problems, as well as general education, will also be included.

The program is under the direction of T. Ross Fink of the education division of the college. It will be conducted by Edward J. Harford.

Oregon Survey

THE establishment of seven "educational centers was one of the recommendations proposed in Oregon as a result of a recent state-wide survey of vocational-technical education.

The education centers, according to the proposal, would be located in different parts of the state to help "provide for a better balance in the post-high-school segments among the needs of those preparing to become skilled, semi-professional, or professional workers," and for more "equalization of opportunity at the post-high-school level."

The recommendation was one of many made by William R. Flesher, director of the survey, in his report to the State Board of Education in September.

Growth in Illinois

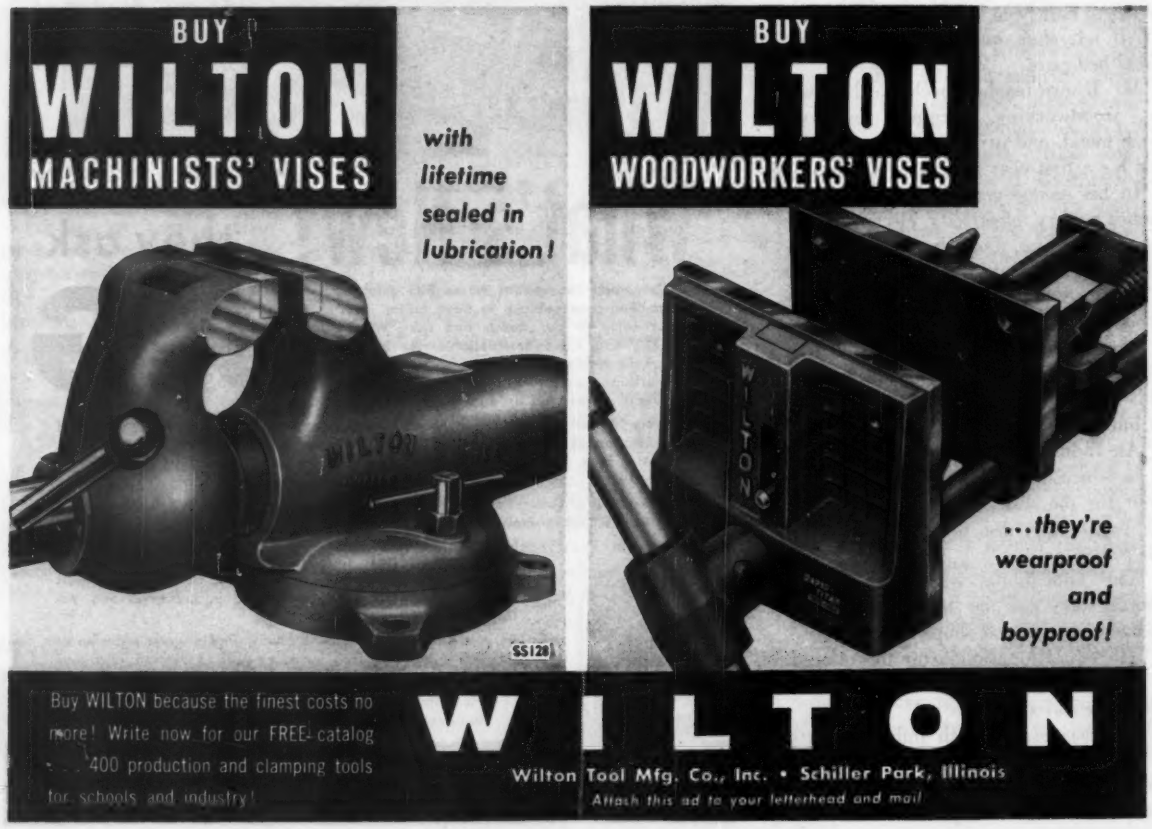
MORE than 72 percent of all schools in Illinois now have industrial-arts programs, according to a news release in the October issue of the *Illinois Vocational Newsletter*. This is an increase of more than 30 percent since 1947.

Day trade preparatory enrolments increased 4.99 percent last year, the release states. Evening trade extension decreased 7.69 percent but part-time trade extension increased 6.02 percent.

A total of 936 vocational-industrial instructors are in the state. Enrolled in part-time and evening trade extension classes are 9635 apprentices. A total of 6708 adults, primarily journeymen, are enrolled in evening trade extension classes.

Reduce Pupil-Teacher Ratio

FEWER pupils per teacher for vocational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education in public schools has been ordered by the Texas State Board of Education to keep the vocational program on an even keel in the face of stiffer graduation requirements in academic subjects. This was the most important change in a list of 1958-59 policy revisions approved by the Texas board in the vocational field.

For reallocation of vocational teacher units, only 20 pupils will be required, instead of 24, and only 64 pupils for the second teacher, instead of 72 as required previously. Requirements were not reduced for initial allocation of teachers.

The board also removed the age requirement for vocational classes. Pupils in high-school may enrol in these classes without having to be 14 years old, as previously required.

Nevada Installs Officers

MRS. Alice Cooper, homemaking teacher at Yerington High School, has been installed as president of the Nevada Vocational Teachers Association for the 1958-59 school year.

Vice-presidents, representing the four divisions of vocational training, are: Clifton R. Hutchens, John Caserta, J. R. Peddicord, and Mrs. Elsie Colvin.

New Chicago School

GROUND was broken in September for the construction of the Charles Allen Prosser Vocational High School in Chicago, Ill. The new building, located on Long Island near Grand, is expected to be ready for occupancy next year.

Oregon Officers

PAUL WILMETH, area supervisor of adult education at Salem, Ore., is president of the Oregon Vocational Association for the current year. Vice-president is Melvin Miller of Dallas.

Discuss Tech Education

TECHNICAL education was one of the main topics for discussion at the annual conference of the Iowa Council of Local Administrators, held Sept. 25-26 at Cedar Rapids. Earl Bowler of the U.S. Office of Education was a featured speaker.

Officers elected at the conference were Leslie Grigg, president; Owen Shadle, vice-president; and Edward Burns, secretary-treasurer.

Brooklyn Guild

MATHEMATICS in Industrial Arts" will be the theme of the January meeting of the Brooklyn Guild of the Industrial-Arts Teachers Association of New York City. The meeting will be held at the Brooklyn Technical High School.

John M. Fontana is president of the Brooklyn Guild for the current year. Other officers are: Harry Berkowitz, vice-president; Philip Weisbard, treasurer; Alan Schilling, recording secretary; and Arthur Katkin, corresponding secretary.

Stout Workshop

A SPECIAL industrial-arts workshop held at Stout State College, Menomonie, Wis., on Oct. 24 was attended by teachers from Wisconsin and Minnesota. Discussion groups dealt with laminated furniture, metal spinning, transistors (theory and application), spot finishing, and research reports. ★

Convention Calendar

California Industrial Education Association, Civic Auditorium, Stockton, Mar. 13-14.

Illinois Vocational Association, Hotel Pere Marquette, Peoria, Mar. 19-21.

Ohio Industrial Arts Association, Neil House, Columbus, Mar. 19-21.

New Jersey Vocational and Arts Association, Asbury Park, Mar. 19-21.

Michigan Industrial Education Society, Pantlind Hotel, Grand Rapids, April 9-11.

American Industrial Arts Association, Long Beach, Calif., April 22-26.

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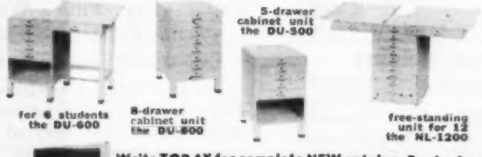

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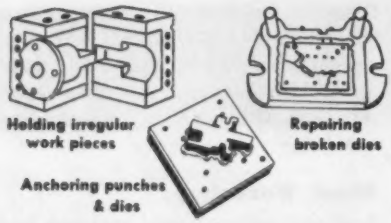

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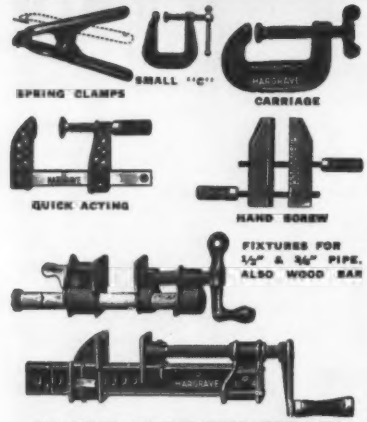

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Books:

Stereophonic Sound. Crowhurst. New York: John F. Rider Publisher, Inc., 1957. Pp. x+118. $2.25.

This book deals with an obscure subject which is just beginning to find a place in the field of radio reception.

The author provides all the information needed to add this new dimension to radio listening pleasure. He explains the theory of stereophonic sound; he discusses the difference it can make in listening pleasure; and he mentions the various systems now available, or likely to be available.

The book will make interesting reading for anyone who is concerned with improving the sound reception from his radio.

Most-Often-Needed Television Servicing Information. Beitman. Highland Park, Ill.; Supreme Publications, 1958. Pp. 192. $3.00.

This is the latest edition of a manual which has long been a valuable aid to technicians, and to school-shop teachers who include radio instruction in their courses.

This new volume covers the latest to the time of publication, and is a worthwhile supplement to the editions that have preceded it.

Fabricating with Formica. O'Neill. Milwaukee: Bruce Publishing Co., 1958. Pp. vii+64. $3.50.

This is primarily a do-it-yourself book which is intended to introduce the amateur craftsman to a relatively new medium, that is both utilitarian and decorative.

The techniques of fabricating this material are explained in simple language that will convince the reader it is just as easy to work as any other materials he may have used in the past.

The author begins by explaining how laminates are made and how to cut them. He describes the type of surface needed for gluing and the kinds of glue to use. He concludes by providing helpful information about trimming and finishing.

James M. O'Neill is head of the industrial-arts department at Baldwin High School, Long Island.

Paper—The Fifth Wonder. Ainsworth. Kaukauna, Wis.: Thomas Publishing Co., 1958. Pp. 192. $4.00.

This is a bound compilation of a series of twelve booklets which set forth, in an interesting fashion, the story of the making of paper. The text is written in nontechnical language and is accompanied by numerous illustrations.

The contents should be of interest to anyone who is concerned with the products of the forest. It should be of special value to school pupils who are engaged in the task of exploring the occupational world.

John H. Ainsworth is employed by a paper company. He has been active in training people for positions in the field of papermaking.

Knife Grinding and Woodworking Manual. (Second Edition.) Monnett. Greensboro, N.C.: Dependable Machine Co., 1958. Pp. ix+167. $5.00.

This edition contains a wealth of information dealing with the operation of woodworking machinery. It is written in everyday shop language, and is intended for use by shop personnel, from the machine operator to the manager.

Among the topics discussed are stoppages and their remedies, machining defects in wood, cutting and feed speeds, setting and jointing knives, and the selection and care of cutter heads and knives.

Farm Welding, Arc and Oxyacetylene Welding. (Third Edition.) Parker. New York: McGraw-Hill Book Co., Inc., 1958. Pp. x+262.

This book is intended to be used by vocational-agriculture students and farmers as a guide in developing ability in the practice of welding.

It covers arc-welding and oxyacetylene welding and cutting. In its various chapters it treats various types of welds most commonly used on the farm.

Included also are lists of suggestions on purchasing and installing welding equipment which should be of special value to anyone who is planning on buying such equipment.

Basic Electricity for Communications. (Second Edition.) Timbie and Ricker. New York: John Wiley & Sons, 1958. Pp. viii+538. $6.25.

This edition has been broadened to bring basic electrical principles to bear on a greater variety of fields of application. Some of the sections have been rewritten, and the diagrams have been redrawn to conform to ASA standards.

William H. Timbie was professor of electrical engineering at M.I.T. for 28 years.

Francis J. Ricker, who revised the book, is senior electronics engineer with a manufacturer of industrial instruments, and was formerly head of the department of industrial electronics at Wentworth Institute.

Most-Often-Needed 1958 Radio Diagrams and Servicing Information. (Vol. 18.) Beitman. Highland Park, Ill.: Supreme Publications, 1958. Pp. 192. $2.50.

This volume covers the needed service material on all popular recent radio sets.

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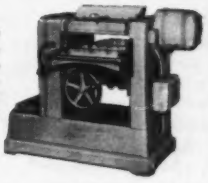

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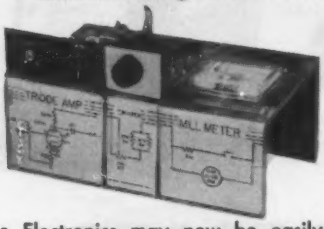

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This new manual contains material on all types of radios, including combinations, record players, auto sets, and transistor portables. Radio technicians will find it to be a valuable aid in their work.

Heirloom Furniture. Gottshall. Milwaukee: Bruce Publishing Co., 1957. Pp. xi+154. $9.50.

This book is the result of many years of study and work. It contains, in detail, instructions for the construction and finishing of 35 pieces of heirloom furniture.

In each chapter the author comments on the origin and value of the particular piece under consideration. He follows this with a complete bill of materials required, and then presents detailed instructions for every process involved.

Anyone interested in reproducing pieces of period furniture will find the volume to be helpful.

Franklin H. Gottshall is a craftsman with wide experience, and he is the author of several books on woodworking.

Pamphlets:

Survey of Industrial-Arts Teacher-Education Programs is a summary report by M. L. Schmitt and DeWitt Hunt of staff, students, and graduates in various institutions throughout the nation. Available from the U.S. Office of Education, Washington 25, D. C.

Audio-Visuals:

Products of the Tree Farm is a new 22" x 34" wall chart in full color which lists many of the 5159 wood products, classifies them according to manufacturing processes, and shows how conservation is practiced in the mills as it is in the woods. Available free from American Forest Products Industries, Inc., 1816 N St., N.W., Washington 6, D. C.

Printing—A Future Unlimited is a 22-minute, 16mm, sound-and-color motion picture covering the vocational and career opportunities offered by the graphic-arts industries. Produced by the Educational Council of the Graphic Arts Industry, 5728 Connecticut Ave., N.W., Washington 15, D. C., it is available for purchase at $250 from the Council or by loan from the Crown Zellerbach Corp., 36 South Wabash Ave., Chicago 3, Ill. West of the Rockies it is available from the same company at 343 Sansome St., San Francisco 19, Calif.

Automation is a 16mm, 84-minute sound motion picture produced by Edward R. Murrow and Fred W. Friendly for the "See It Now" TV program. It presents viewpoints on the effect of automation on American life and pictures automation in action in various industries. Available at $275 per print from Text-Film Dept., McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N.Y.

How to Drive on Snow and Ice is a 13-minute motion picture showing student drivers learning proper techniques. A 40-page course of study is also available on the topic. Both may be obtained free from the Public Relations Dept., Seiberling Rubber Co., Akron 9, Ohio.

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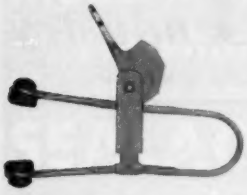

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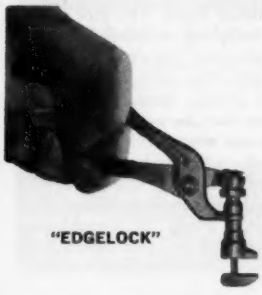

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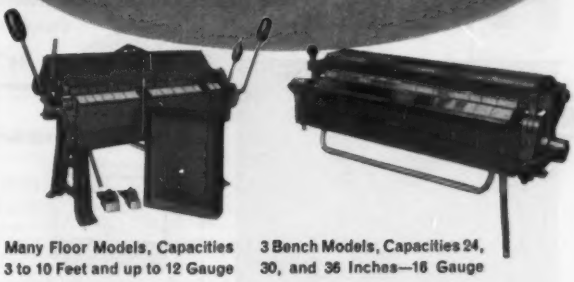

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news from Industry

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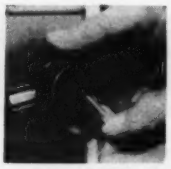
New EICO Demonstrator

VTVM Dynamic Demonstrator, a new EICO training aid, is designed to help instructors teach students the operation of a vacuum tube voltmeter.

The demonstrator, which simulates the EICO No. 221 VTVM in all its functions and ranges, has a 13″ meter scale for easy classroom viewing. Overall, it is 14¾″ wide, 23″ high, and 3½″ deep. Constructed of steel with an aluminum panel, the demonstrator can be placed atop a desk or mounted on a wall.

For more information write EICO (Electronic Instrument Co., Inc.), 33-00 Northern Blvd., Long Island City 1, N.Y., mentioning SCHOOL SHOP; or *circle no. D-1 on the business-reply card.*

Yale Lock-It Plug Guards Against Electrical Hazards



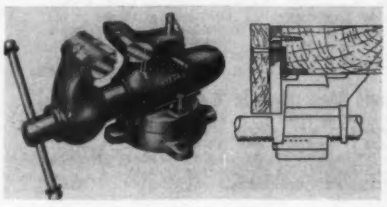
A new Yale Lock-it Plug, designed to guard against electrical hazards, is said to be ideal for use in school shops where electrical equipment is used.

The plug has a key-operated nylon safety bar which, in its locked, projecting position, prevents the entrance of the plug into an electrical outlet. The safety bar is retracted by turning the key to the unlocked position, thus making it possible for the plug to fit into an outlet.

Unauthorized use of power tools and other appliances can be eliminated by the use of this plug, the manufacturer states. The plug bears the Underwriters' label.

For more information write Yale & Towne Manufacturing Company, Chrysler Bldg., New York 17, N.Y., mentioning SCHOOL SHOP; or *circle no. D-2 on the business-reply card.*

Wilton Tool Announces Two New Vise Developments

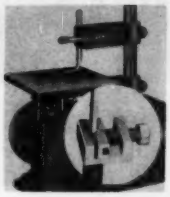


First is a new swivel-jaw vise for clamping irregular or tapered work pieces. The back jaw of the vise is on a pivot with a pin holding it in place. With the pin removed, the jaw can be pivoted to lock angular work pieces securely in place. When the pin is re-inserted, it holds the rear jaw accurately parallel to the front jaw. A drift pin in a horizontal relief hole makes it easy to remove the vertical taper pin. The pins are connected with a strong chain to prevent loss.

Second is a new design feature for Wilton's woodworkers' vises which makes it possible to put a new maple face on the stationary jaw without loosening the screws that hold the vise to the edge of the bench. There are two threaded holes in the stationary jaw casting, beneath the mounting holes. The face plates are made with matching countersunk holes and can be installed or removed by turning the screws through the jaw face and the special threaded holes. Once the vise is mounted, it never has to be removed. The mounting screws are now positioned so vises can be mounted without interference on benches with steel splines.

For complete information write Wilton Tool Mfg. Co., Schiller Park, Ill., mentioning SCHOOL SHOP; or *circle no. D-3 on the business-reply card.*

Keller's New File Chuck Permits Easier File Changing



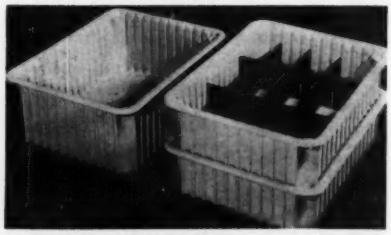
Easier changing of files on Keller die filers is possible with a new file chuck recently introduced by Sales Service Machine Tool Co.

The company states that a floating jaw that is tightened by a single screw automatically accommodates itself to any shape of shank. It declares that this new chuck allows faster file changing with less adjusting plus faster filing because of the maximum file support.

The new chuck is being used on Keller die filers now in production and is available for replacement on all units now in operation.

For more information write the manufacturer, 2363 University Ave., St. Paul 14, Minn., mentioning SCHOOL SHOP; or *circle no. D-4 on the business-reply card.*

Adjustable Tote Box Helps Solve Storage Problems



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Our new pocket size Sealacell Penetrating Process Wood Finishing Manual is free on request. Additional student copies sent free with your order of materials.

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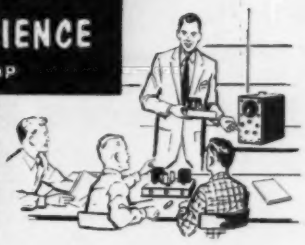

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Covers 550 to 1600 kc and features miniature tubes, 3½" PM speaker, and built-in antenna. Cabinet available.

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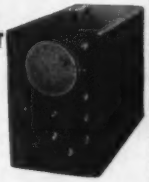

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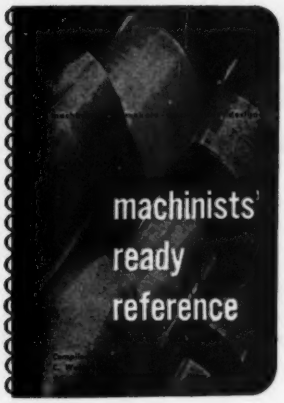

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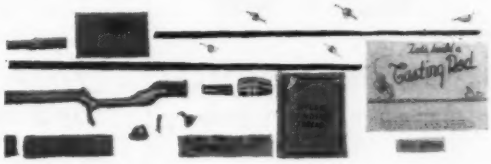

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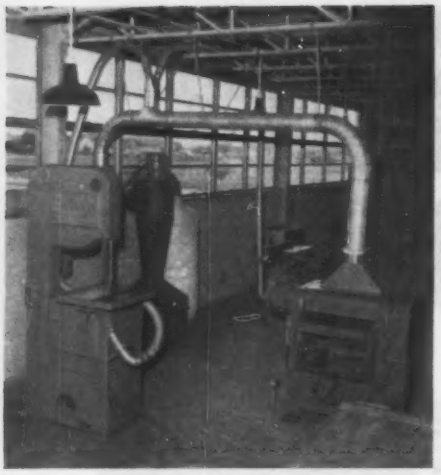

school shop case history:

ONE TORIT CYCLONE DUST COLLECTOR CLEANS 3 WOODWORKING MACHINES

Fred A. Koertge, Industrial Arts Instructor, Refugio High School, Refugio, Texas, says: "The Torit Dust Collector is very efficient, not noisy, and is very clean. The three machines serviced are a 20" planer, 20" band saw, and 10" jointer. There are gates in the pipeline at each machine and they can be opened or closed separately."

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Now you can do high torque work with a Sturtevant Torque Wrench of normal capacity range—small in size—light in weight—with fine increment markings and moderately priced.

With a new Multi-range, Multi-purpose Adapter you can step up the capacity of your Torque Wrench to a new high range and you can plug in any drive end you want . . . Box wrench, ratchet, drive square for sockets.

All drive end accessories are interchangeable and stock items.

In this way each Sturtevant Torque Wrench effectively equals two complete sets of ordinary single purpose Torque tools.

WIDE CHOICE OF INTERCHANGEABLE DRIVERS

Adapter Slide rule sent FREE if requested on company letterhead.

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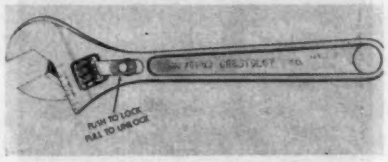
wood Plastic Arts Inc. Adjustable dividers inserted in ribbed wall indentations make separate compartments from 1" square to full box size. Formed from U.S. Royalite, a durable rubber-based plastic, the boxes have one-piece construction and are said to be acid, alkali, and grease proof and will not chip, break, or splinter in normal use. The boxes stack and are available in over 60 sizes.

For further information write Hollywood Plastic Arts, Inc., 515 E. 9th St., Los Angeles 15, Calif., mentioning SCHOOL SHOP; or *circle no. D-5 on the business-reply card.*

New Locking Adjustable Wrench Offered by Crescent

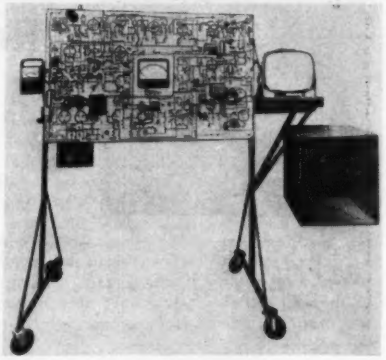


A new wrench called "Crestolock" is now offered by the Crescent Tool Co., originators of the Crescent wrench. Basically it is the Crestoloy wrench plus a simple, positive locking device consisting of a pair of stainless-steel spring leaves which engage the serrations on the adjusting knurl, states the company. This permits infinitely variable locked adjustment to any precise opening within the wrench's capacity.

Scale markings on the jaws permit presetting to any opening. The lock is operated by the thumb of the same hand that holds the wrench and can be operated from either side. If the lock should be damaged, the wrench is still operative. Available in 8", 10", and 12" sizes.

For further information write Crescent Tool Co., Jamestown, N.Y., mentioning SCHOOL SHOP; or *circle no. D-6 on the business-reply card.*

Low-Cost Electronic Demonstrator Developed



An Electronic Dynamic Demonstrator, developed by Transvision, Inc., is designed to teach the basic principles of electronics from the fundamental electronic circuits through radio and television.

The demonstrator consists of a 3' x 5' breadboard. When completely assembled it is an operating television receiver superimposed on a large circuit diagram. The parts are connected or disconnected by a new type of connecting device which requires no soldered joints, the company states.

In conjunction with each circuit, Transvision provides a Teacher's Manual with a course of

PARKS PLANERS Give Your Students Practical Experience on Popular Industrial Machines

. . . the experience of working on the same type of high-speed planers they will eventually use in their trade.

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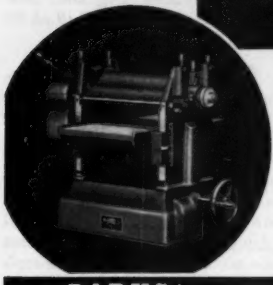
PARKS NO 20—A modernly designed, precision-built, high speed production surfacer that planes lumber up to 20" wide and 6" thick. Available with knife-grinder at additional cost.



12" THICKNESS PLANER

PARKS NO. 95 — A compact, sturdy thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive literature on both machines illustrated as well as on PARKS wood- and metal-cutting Band Saws, Radial Saws, Planer-Jointer Combination Machines.

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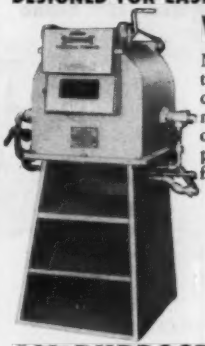
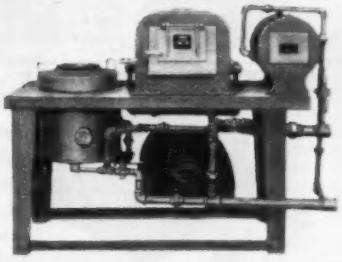


WIDE RANGE OVEN

No. 128 Wide Range Oven provides wide temperature range; 300° F. to 2400° F; covers practically every phase of heat treatment. Can be used for annealing, pack carburizing, hardening, preheating, tempering and general heat treating. Ideal for general school use.



ALL PURPOSE FURNACE

Triple Purpose D, illustrated at right, is a combination pot, oven and forge furnace. Can be used for oven furnace hardening—lead, salt or cyanide hardening—lead, salt or oil tempering—forging, welding, tool dressing—annealing, normalizing, pack carburizing—non-ferrous metal melting. Also available in other combinations.

Sunbeam also builds a companion Charcoal Generator and 450° F. to 2450° F. Electric Furnaces. Information and prices sent immediately.

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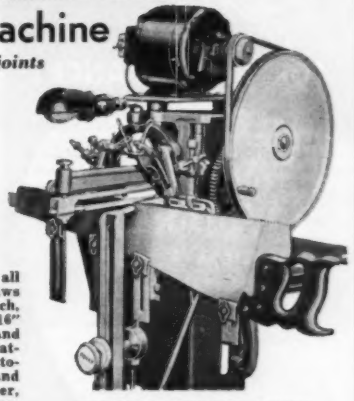
automatically files and joints

HAND, BAND, CIRCULAR SAWS



The Foley Saw Filer is ideal for sharpening saws used by students in school shops. It keeps them in tip-top shape, faster and better than by hand filing. Used by Army, Navy, hundreds of manual training departments and industrial plants. The Foley is the only machine that files and joints all hand, back, and mitre box saws from 3 to 16 points per inch, crosscut circular saws up to 16" diameter (24" optional), and band saws up to 24' long. Patented jointing principle automatically evens up large and small teeth, so saw cuts faster, truer, cleaner—stays sharp longer. Foley filed saws have less breakage and last longer.

30-DAY TRIAL OFFER

You may have the privilege of using the Foley Saw Filer in your own shop for 30 days. Write or send coupon for details and list of school users.

TYPICAL SCHOOL USERS

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FOLEY Automatic SAW FILER

FOLEY MFG. CO., 3316 N.E. 5th St., Minneapolis 18, Minn.
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Your students will learn simple and compound angle set ups for any machine tool used in tool room or on production • Double swivel cradles (each allowing 90° adjustment), over a full swiveling base (allowing 360° rotation) for three separate motions —individually adjustable and lockable • Fully graduated.

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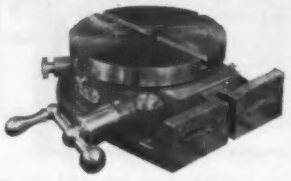

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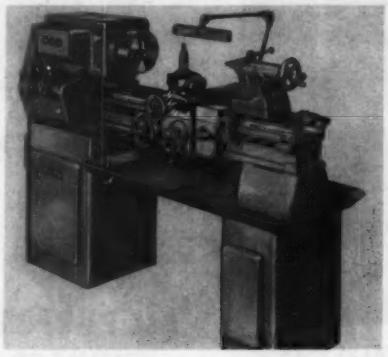
study and lesson material which tie in with the parts and circuits being used.

For more information write Transvision, Inc., New Rochelle, N.Y., mentioning SCHOOL SHOP; or *circle no. D7 on the business-reply card.*

Sheldon Machine Announces New 15" Lathe



A new 15" Sheldon Lathe, designed to fill the gap between conventional belt-driven and geared-head lathes, has been announced by Sheldon Machine Co., Inc.

The new lathe, the company states, offers big capacity features at low cost. It points out that the most significant new design feature is the fully enclosed headstock with its "work-holding-only" spindle. All radial and thrust loads from the drive are absorbed by a large tapered roller bearing supporting an input pulley in the rear of the headstock wall. Power is then transmitted to the spindle through a positive lock clutch in direct drive, or through gears in backgear drive, which permits the spindle to utilize its full capacity as a work holder.

For more information write Sheldon Machine Co., Inc., 4258 N. Knox Ave., Chicago 41, Ill., mentioning SCHOOL SHOP; or *circle no. D-8 on the business-reply card.*

Armstrong Bros. Offers Literature for Students

Shop teachers wishing to give students various pieces of literature covering specifications for tool holders, cutter bits, and carbide cutting tools may request them in quantity lots. Four different sheets or folders are available which may be secured in quantity for student distribution by writing directly to the company. First come, first served.

Write directly to Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago 30, Ill., mentioning SCHOOL SHOP and giving number of pieces of literature desired.

New Literature:

Planning a School Wood Shop is a pamphlet issued by Duro Metal Products Co. which gives specific recommendations for laying out a wood shop. Templates for various woodworking machines are included as well as a model floor plan and suggestions regarding equipment. Write to Duro Metal Products Co., 2651 N. Kildare, Chicago 39, Ill., mentioning SCHOOL SHOP; or *circle no. D-9 on the business-reply card.*

Electronic Kits Supply Co. 1958-59 Catalogue covering electronic teaching aids, Packard-Bell radio kits, and demonstrator boards is now available. Many kits include transistors. Write Electronic Kits Supply Co., 1727 Glendale Blvd., Los Angeles 26, Calif., mentioning SCHOOL SHOP; or *circle no. D-10 on the business-reply card.*

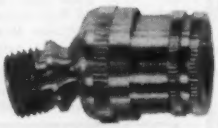
Barrett Brake School Manual, third edition, has 260 pages including 405 illustrations covering all phases of brake service work, fundamentals and principals of operation on each type of brake system, and the use of precision equipment and trouble-shooting of brake systems through 1958 models. For information write Barrett Equipment Co., 2101 Cass Ave., St. Louis 6, Mo., mentioning SCHOOL SHOP; or *circle no. D11 on the business-reply card.*

Catalog No. 28, published by Foster Manufacturing Company, lists storage equipment for letterpress and offset plants. Many new items are included, including make-up cabinets and storage benches. For a copy write to the company, 13th and Cherry Sts., Philadelphia 7, Pa., mentioning SCHOOL SHOP; or *circle no. D-12 on the business-reply card.*

Boice-Crane Power Tool Catalog 59 has just been issued and contains full details on band saws, contour saws and band filers, jig saws, saw jointers, saw tables, shapers and shaper cutters, drill presses, tool and knife grinders, jointers, lathes, planers, belt and spindle sanders, spinning tools, motors, controls, supplies, and accessories. A free copy of the 52-page catalog will be sent to anyone addressing their request to the Boice-Crane Co., 938 W. Central Ave., Toledo 6, Ohio, mentioning SCHOOL SHOP; or *circle no. D-13 on the business-reply card.*

(*Continued on page* 40)

NEW—GEARON LAMP PARTS CATALOG NO. 10



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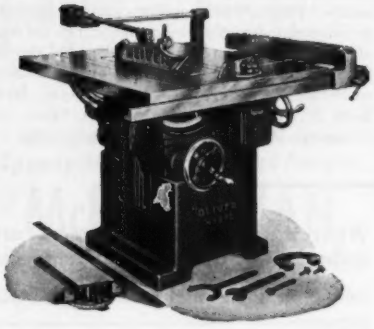
OLIVER Saw Benches make easy work of hard cuts

The popular medium-size No. 270 is found in many school shops



This industry-proven Oliver Saw Bench rips, crosscuts, dadoes, miters accurately. Saw arbor tilts up to 45°. Gauges and table are graduated to cut a perfect miter, cut-off to length or rip to width without delays for checking measurements. Rips to 16" wide to left of saw, 29" to right. Crosscuts up to 16" wide, 3" thick. Get all the facts on this sturdy Saw Bench. Write for Bulletin No. 270.

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Band Saws	Mortisers	Speed Lathes
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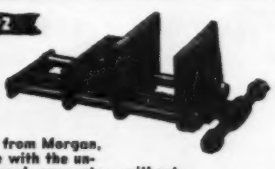

Choose from Morgan, the vise with the unconditional guarantee without time limit restrictions. Choice of complete range of sizes and types with Morgan's Woodworkers' (with solid aluminum handle), Machinists', Pipe and Combination Pipe Vises. When ordering complete bench unit from bench mfr. specify Morgan Vises.

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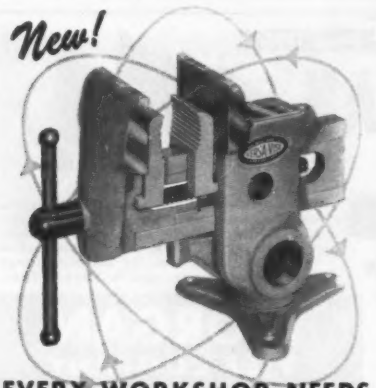

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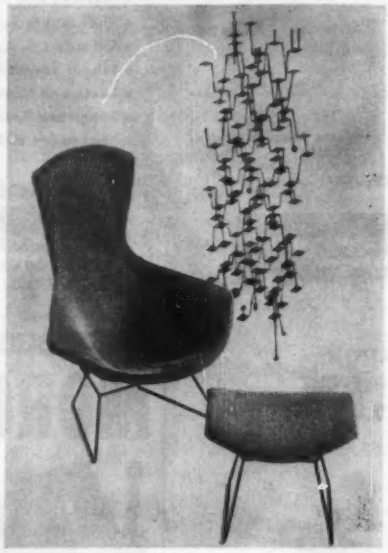
ATF Chief 15 Booklet is now available which describes the special operating and construction features of the press in the 11" x 15" size range. Details of paper feeding, interchangeable ink units, and speed control ranging from 3400 to 7200 impressions per hour are some of the many features included. Write to American Type Founders Co., Inc., Elizabeth, N.J., mentioning SCHOOL SHOP; or *circle no. D-15 on the business-reply card.*

Wetzler Clamp Catalog No. 58 gives complete information on the Wetzler clamp line from the "Clampette" to veneer press frames. Specifications for all styles of clamps are given. For a copy, write Wetzler Clamp Co., Inc., 43-15 11th St., Long Island City 1, N.Y., mentioning SCHOOL SHOP; or *circle no. D-16 on the business-reply card.*

A new catalog, recently published by Gilbert & Miller, Inc., lists many new items recommended as supplements to work in crafts. Included are glass timers, clocks, barometers, thermometers, letter-opener blades and handles designed to stimulate creativity and ingenuity on the part of the students. The catalog also lists pen and pencil desk sets and swivel funnel holders. For a free copy of the catalog write the company, 404 Fourth Ave., New York 16, N.Y., mentioning SCHOOL SHOP; or *circle no. D-17 on the business-reply card.*

Project Design

What the industrial designers are doing (one of a series)



HIGH BACKED CHAIR AND OTTOMAN
Designer: HARRY BERTOIA
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FOLLOWING last month's introduction to the work of Harry Bertoia for Knoll Associates, this high-backed chair and ottoman of his seems a logical follow-up. In the background is a typical abstraction by Bertoia in metal. Thus, both phases of his imaginative work are seen in a single photograph. In recent years Bertoia's reputation in utilitarian objects of metal, such as the furniture illustrated, has been growing steadily. However, since he is first and foremost a sculptor who works with metals, it is in this area that he is best known. As a matter of fact, many would claim that he is the first and foremost metal sculptor in the world today. His much-heralded abstractions are found in leading museums throughout the country, as well as in homes and commercial establishments.

The reader who is left cold by the fanciful intricacies of the piece of metal sculpture would probably find much more in the chair and ottoman and would very likely appreciate their restful comfort. With its high back, this chair would soon have the entire body relaxing and ridding itself of muscular tensions built up during the day. With few exceptions, most contemporary (or traditional, for that matter) chairs show little concern for the need for a head rest. Designers today may be afraid of giving birth to a top-heavy monster. Or the Japanese influence toward the "long and low" may account for the scarcity of well-designed chairs of this nature. Here then is a chair for the man who would just as soon doze through some TV show and would prefer to sleep through parts of his wife's account of her discussion with the butcher.

Basically the structural principle of the chair is identical with that of the chair illustrated last month—a steel rod frame which supports a heavy wire meshwork over which is fastened foam rubber and upholstery material. Its lines are unmistakably forceful and flow skillfully to merge the back with the seat itself. The appearance is light; the material is used simply and sparingly to avoid the impression of excess bulk for heavy elegance. As in the case of the "Diamond" chair shown last month, a swivel between the supporting structure and the upholstered portion allows backward and forward movement which permits the sitter to find the most comfortable angle.—*Robert A. Tinkham, Associate Professor of Industrial Education, University of Illinois, Urbana.* ★

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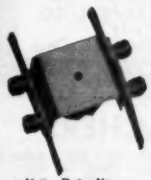

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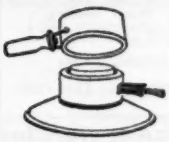

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Washington . . . . *from page 44*

ministered by new machinery, rather than by the existing branches of the Vocational Educational Division. It is his plan, therefore, to set up, for the duration of the Act, an area vocational education branch. This branch would be staffed by a director and five program specialists, plus a number of administrative and secretarial assistants.

But it will take time to recruit these specialists. To lose no time, therefore, Dr. Pearson has surrounded himself with some temporary advisers, each with a unique competency:

Lewis A. Wilson, formerly New York State commissioner of education, is on the job to plan how the area vocational programs might gear into the total educational program of a state. Thus, Dr. Wilson may concern himself with the kinds of schools or educational organizations which could offer area courses. Certainly, he will give consideration to the use of the traditional and the comprehensive high schools, the community college, the technical institute, and the apprenticeship program as vehicles for the new offerings. His job will be to search out successful examples of statewide patterns for area vocational schools (and then, of course, to let state officials choose those which they like best).

Walter M. Arnold, Kansas State director of vocational education, is also on the job on a temporary basis. His role is to study the tie-in of the area courses to existing vocational education; and to probe into problems of state finance, legislation, and accounting arising out of the new activity.

George L. Brandon, Michigan State University, has been called in to give his attention to the still-perplexing question of what *is* a highly skilled technician in the American technology. He will not only analyze the skills and competencies which go into the making of a technician, but also try to chart the supply and demand, industry by industry, for this new type of expert.

Finally, Lynn A. Emerson, professor emeritus in industrial education, Cornell University, is back on the job to be concerned primarily with developing instructional materials and suggesting course sequences for training technicians.

Referring to Dr. Emerson's assignment, Dr. Pearson said:

"Here is the big void. Here is where a good deal of our effort has to be made. One of our objectives is to develop some new teaching materials or to scour around for them in industry, the defense establishment, or local school systems."

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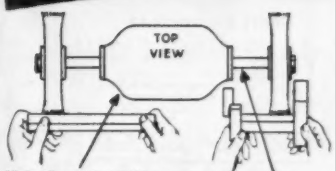

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Among the proposals being considered is to contract several technical authors to prepare sample teaching units or manuals. Another proposal is to set up a curriculum materials laboratory, in Washington, where teaching tools for high-grade technicians could be assembled, catalogued, and loaned to those who request them.

These four temporary advisers, then, make up the nucleus for the more or less permanent area vocational education branch which will come into being later. We say "more or less permanent" because it is no secret that the area vocational education concept is no passing fancy. After the Defense Education Act expires (within four years) the need for advanced technical training, using the area concept in addition, will remain. Exercising vision, Dr. Pearson is now blueprinting the kind of staff he'd like to see operating a permanent area vocational program.

Take It Seriously.—To return to more immediate plans, one of them, Dr. Pearson tells us, is to schedule an across-the-country tour of federal specialists to confer with state officials about the workings of the new program. As soon as some of the more permanent staff members of the area vocational branch are recruited, they would "make themselves available" in strategically located cities to answer questions from state officials and to provide help in drafting state plans under the new Act.

One outcome of such a tour might be a greater national consciousness of the importance of the new legislation.

"Some of the less industrialized states don't see anything in this program for them. Others, without defense industries, are led to believe it's for the other fellow," Dr. Pearson says. "The truth is this program is for the whole nation, which means it is for each and every state to take seriously. Technicians trained in rural Arkansas may be employed by defense industries in Kansas. Technicians trained in Minnesota may be called on to go to Guam.

"It's true that in the past vocational offerings were geared to local needs. Awareness of local needs is still important in training skilled workers. But we are here concerned with something higher than skilled labor. The need for scientifically oriented technicians is larger than local or state. When it comes to taking part in the National Defense Act Title VIII which deals with area programs, we have to open our eyes wide to see our national needs and national opportunities."

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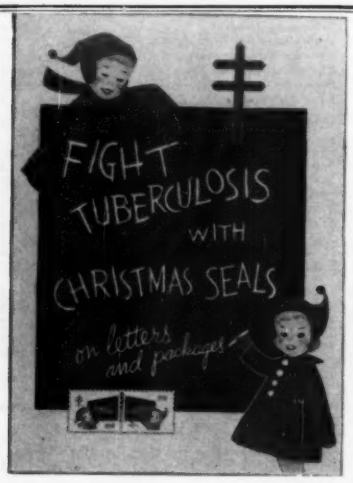

A Profile of Industrial Arts.—For some time now, we have been keeping in our pocket a sheaf of notes dealing with the activities of Marshall Schmitt; and while what follows has no direct relation to what has been written above, it is time—at year's end—to go on record with it.

Marshall Schmitt is the federal industrial-arts specialist. His big job at present is to find out what the state departments of education recommend for industrial arts. To do this, he has assembled all the industrial-arts guides published by state departments of education for elementary and secondary schools. Before plunging into them, however, he did some thinking about content analysis. In other words, how does one go about finding out what a stack of documents tries to communicate? The answers, Mr. Schmitt thought, might lie with some of the communications experts; or perhaps with those psychologists who have been concerned with techniques for analyzing what people try to do and say.

Fortified with this bit of extra research, Mr. Schmitt tackled the guides themselves. He read and analyzed each one, summed up their content, and now has on his desk an annotated list of the guides.

The next step, Mr. Schmitt tells us, will be to set up some 32 categories around which to cluster the state department recommendations. Most of these categories will deal with subject matter—that is, woodworking, leather, metal, ceramics, and so on. But in addition, Mr. Schmitt will search the guides for information on recommended time allotments, suggested methods for instruction, and plans of administration.

What we should have, when Mr. Schmitt is done with this chore, is a profile of industrial arts as recommended from the state capitals. When completed (in about another year or so), the report should tell industrial-arts people, "This is where we are."

Mr. Schmitt tells us that he does not plan to evaluate the recommendations as he finds them in the state guides. He believes, however, that once people have a picture of what the states recommend, they'll be impelled to ask: Is this adequate? Is this good? Is this worth keeping? If the answer to any of the questions is in the negative, then the states can proceed to make changes. ★

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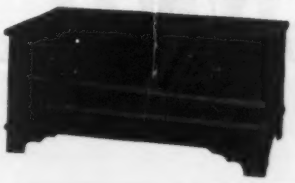

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from Washington

by Michael Paca

Not More of the Same.—The lawyers in the Department of Health, Education, and Welfare are still at it. They're still studying the National Defense Education Act of 1958 and, as a next step, reviewing the regulations which those who have to put the Act into motion would like to put into the hands of the people in state departments of education. So far, no regulations have been issued, which means the Act is still pretty much in the paper stage. It appears, however, that the first regulations to come out with the lawyers' OK will be those dealing with Title VIII, the area vocational education programs.

We haven't yet seen a draft of these regulations, but we understand that they'll stress the severe limitations of the new legislation. It is still not easy for some vocational educators to grasp that the new Act does not provide more money simply to carry on more of the same traditional vocational activities. The regulations, we are informed, will emphasize that the new grants must be used only for training highly skilled technicians; that these technicians must have a direct connection with defense or military activities; and that once such courses are created, they must be open to people living in an area larger than the school district.

What, then, is a highly skilled technician? We heard this question repeated time and again through the corridors of the U. S. Office of Education, but the answer was not long in forthcoming in each instance. A technician is someone who is more than a superskilled craftsman. No matter how expert a person is with hand skills, he still may not measure up to the technician concept. In fact, a technician may possess few manipulative skills. What distinguishes a technician from a skilled craftsman is the former's mastery of knowledge, principle, and theory. To make it even more specific, the technician must have a knowledge of mathematics and such related courses as physics, chemistry, or electronics. It is for such people that the new training opportunities have been created. The forthcoming regulations, we understand, will try to make this unequivocally clear.

We had been expecting that the new regulations would also list the occupations for which these highly skilled technicians are to be trained. However, there appears to have been a change in tactic. Instead of listing the occupations by name, the new regulations will simply set up criterions on the basis of which state officials can themselves name the trainable occupations. Thus, any occupations needed in the military or those needed by industries working on a defense contract, or defense subcontracts, can be designated by state authorities as "necessary for national defense."

"We believe the states ought to make as many of the decisions as possible," says James Pearson, head of the federal Vocational Education Division, "provided, of course, they keep within the framework of the Act and its regulations."

We asked: Will the states have to match funds under the new title? The answer appears to be yes. At first, there was some notion that since states are already spending $4 for each U. S. $1, no further matching would be needed. The wind seems to be blowing against that notion.

We asked: Will the new regulations say anything about paying transportation of students? Yes, transportation of students is a new wrinkle in operating vocational education, and the new rules will probably have a good deal to say about it. The chances are that money will be available to pay for daily commuting to and from school and for transporting students for field work when necessary.

We asked: How will the new activity affect the setup of the federal Vocational Education Division? The answer to this question requires more space than a single paragraph.

New Machinery.—It is Dr. Pearson's conviction that Title VIII should be ad-

(*Continued on page* 41)

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29	Gilbert & Miller, Inc.	41
30	Giles & Kendall Co.	42
78	Globe Box Co.	41
31	Greenlee Tool Co.	5
32	Gyro Lamp & Shade Corp.	42
33	Hardwood Corp. of America	26
34	Heath Co.	35
35	Kit Kraft	42
36	Kuempel Chime Clock Co.	43

No. to circle on Card		*Page No.*
37	Magna-Set Co.	41
38	Master Specialty Co.	32
39	McEnglevan Heat Treating & Mfg. Co.	41
40	McKnight & McKnight	31
41	Metal Goods Corp.	25
42	Frank Mittermeier	42
43	Modern School Supplies	43
44	Montgomery & Co.	39
45	Morgan Vise Co.	39
46	Nat. System of Garage Ventilation	40
47	Nolan Corp.	42
48	Nolan Corp.	43
49	Northfield Foundry & Mach. Co.	31
85	Old Pioneer Archery	35
50	Oliver Machinery Co.	39
51	O'Neil-Irwin Mfg. Co.	5
52	Parks Woodworking Machine Co.	37
53	Patterson Bros.	39
54	Peck, Stow & Wilcox Co.	39
55	Pioneer-Toledo Corp.	43
56	Plastic Products Co.	43
57	Powermatic Machine Co.	38
58	G. A. Pratt Co.	43
59	John F. Rider, Publisher	33
60	Howard W. Sams & Co.	31
61	Sax Bros., Inc.	42
62	Seeley's Ceramic Service	42
63	Sheldon Machine Co.	23
64	Skil Corp.	Cov 2
65	Stacor Equipment Co.	29
66	Standard Pressed Steel Co.	Cov 4
67	P. A. Sturtevant Co.	36
68	Sunbeam Equipment Corp.	37
69	James L. Taylor Mfg. Co.	42
70	Telephone Engineering Co.	42
71	Tepping Studio Supply	42
72	Thos. C. Thompson Co.	41
73	Torit Mfg. Co.	36
74	Universal Vise & Tool Co.	38
76	Versa Vise	40
83	Wedgelock Corp.	33
75	Wells Mfg. Corp.	3
77	Wilton Tool Mfg. Co.	28

FOR COMPLETE PRODUCT INFORMATION USE THIS CARD

SCHOOL SHOP: Please have companies whose numbers I have circled below send me complete product information without further obligation. (This card is good until Feb. 28, 1959.)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140

"News from Industry" Items

Please send me the following items listed in the "News from Industry" section of this issue of SCHOOL SHOP:

D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
D11	D12	D13	D14	D15	D16	D17	D18	D19	D20

Name _____

School _____

School Address _____

City, Zone, State _____

_____

Subjects taught: _____

_____

Please send me information on: _____

12-58

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BUSINESS REPLY CARD

First Class Permit No. 208, Ann Arbor, Mich.

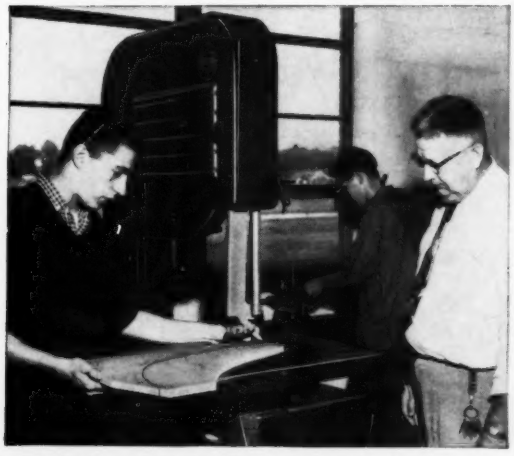
SCHOOL SHOP

330 Thompson Street

Ann Arbor, Michigan

DELTA POWER TOOLS

At Oscar Frommel Smith H. S., South Norfolk, Va. they
Teach With Tools That Industry Uses



BIG CAPACITY DELTA 20" BAND SAW is used for big projects in the Delta-equipped Wood Shop. Delta tools are used in all three shops because at Oscar Frommel Smith (as in all schools) student safety is of prime importance.

Oscar Frommel Smith High School develops student skills and trade techniques useful in the shops and building trades at the Norfolk shipbuilding center. And according to Edward Radke, Vocational Department Chairman, "*We give students practical work on the same Delta Tools they will be using later on in industry.*" The school's most recent purchase of Delta Tools included seven new Delta 11" Metal Lathes for the Machine Shop.

Delta Power Tools are *practical, rugged, and safe*—the most widely used power tools in general industry—that's why over 72% of U. S. schools teaching shop teach with Delta Tools. And because Delta is the world's most complete line (53 machines, 240 models, over 1300 accessories) you get the *right* tool for teaching *every* wood and metalworking operation.

Delta's leadership is based not only on quality tools but on the highest type of cooperation and helpful service given by *all* Delta Dealers. Your nearby Delta Dealer is listed under "TOOLS" in the Yellow Pages . . . call him or stop in and see the full line of Delta wood and metalworking tools.

FREE Delta Industrial Catalog

Get all the facts on Delta wood and metalworking tools PLUS helpful teaching aids for industrial arts instruction. Write to: Rockwell Mfg. Co., Delta Power Tool Div., 412 M, N. Lexington Ave., Pittsburgh 8, Pa.

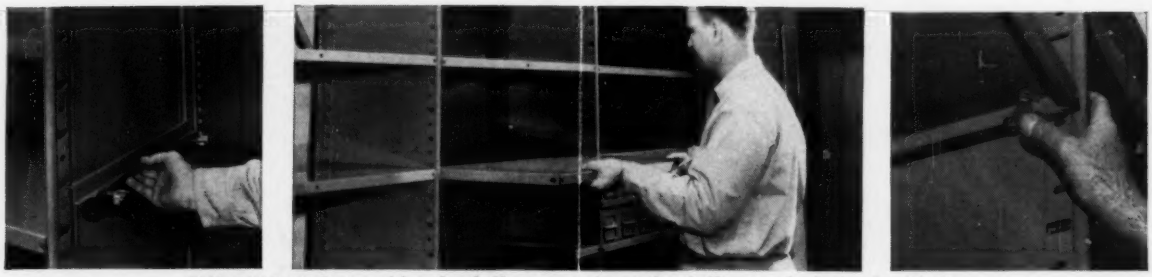
DELTA POWER TOOLS

another fine product by

ROCKWELL

Only New HALLOWELL *ERECTOMATIC*® Steel Shelving

has a time-saving, positive built-in lock—plus these features:



FAST ASSEMBLY. Just position the shelf supports, insert the shelf, press the locks. Straight-in, straight-out shelf change. No tilting. No dismantling. No interference with any other shelf.

New Hallowell ERECTOMATIC® steel shelving goes up fast, can be rearranged in seconds. It's the unique built-in locking device* that cuts assembly time, speeds repositioning of shelves. Here's how easy it is! To position a shelf—slide it into place on the shelf supports, press the locks, and the job is done. To reposition a shelf—release the locks, pull the shelf straight out, slide it straight in on the supports at its new location, and press the locks. It takes only seconds to complete the move.

New Hallowell ERECTOMATIC steel shelving is available in all types, too. Open, closed, bin units, ledge units, counter units, and cabinets are made of prime steel, phosphate coated, and finished in baked-on enamel. Standard is SPS green, other colors are available.

Investigate new Hallowell ERECTOMATIC before ordering shelving. You'll find it stocked by leading school supply distributors and shop equipment dealers everywhere. Contact the one nearest you.

*Patent applied for

Or write Columbia-Hallowell Division, SPS, Jenkintown 75, Pa., or SPS Western, Santa Ana, Calif.

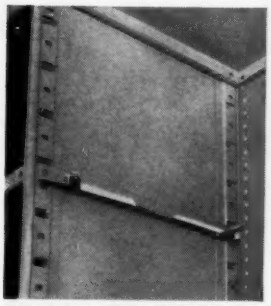
QUICK SHELF CHANGE. Release the locks, remove the shelf and its supports, relocate, and press the locks.

INDEPENDENT SHELF POSITIONING. Each shelf can be individually repositioned in seconds.

FULL USE OF SHELF AREA. No tees or angles, and beaded posts save valuable space.

COMMON SIDE PANELS AND POSTS save material between adjacent units in rack. Back and side panels are one-piece.

BEADED POSTS AND FLANGED SHELVES prevent snagging of clothing or stored goods, protect workers.



FULL DEPTH SHELF SUPPORT. No buckling possible. Reinforcements can be added when they are required.

4 CLASSES OF SHELVES. Regular, medium, heavy and extra-heavy construction meets all load requirements.

SPS Jenkintown • Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.